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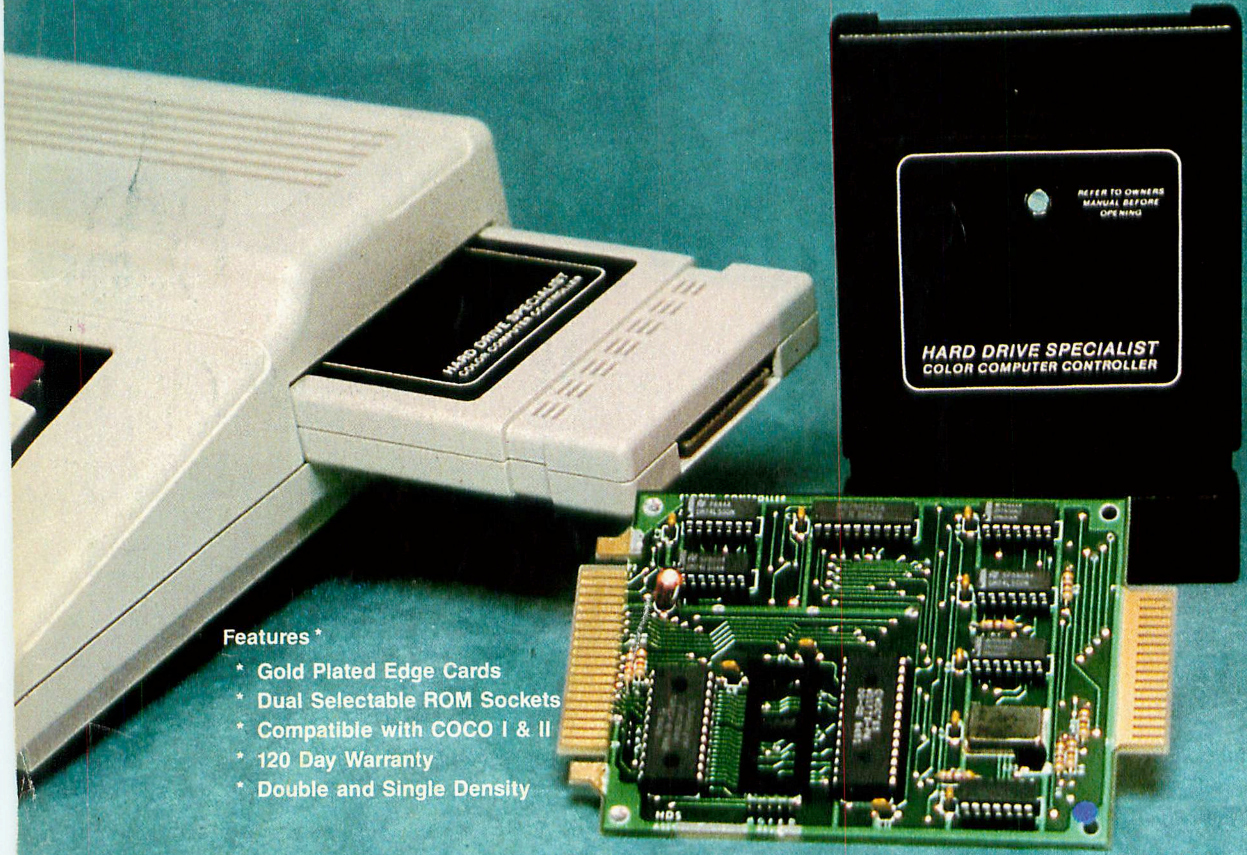
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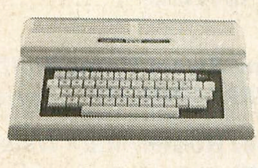

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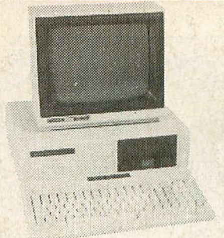

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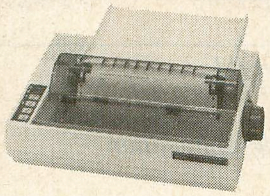

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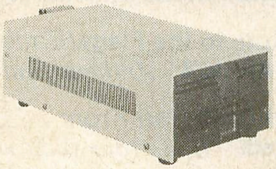

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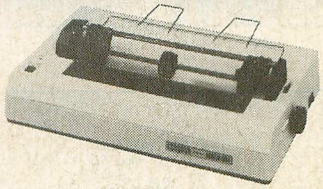

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Under The RAINBOW

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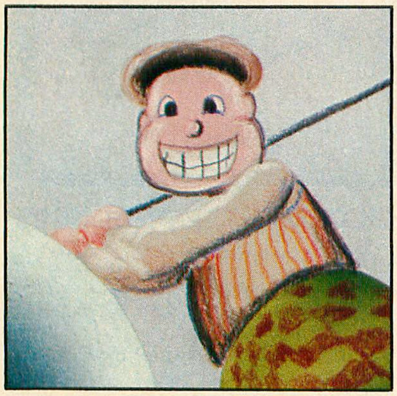
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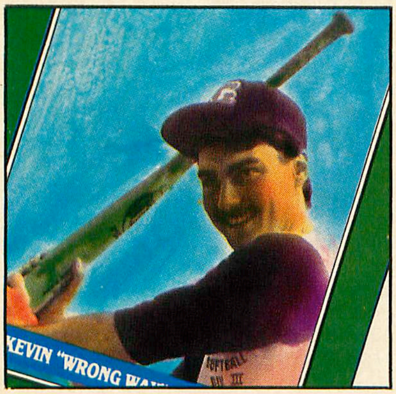

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The small cassette tape symbols beside features and regular columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE, ready to CLOAD and RUN. For full details, check our RAINBOW ON TAPE ad on Page 213.

NEXT MONTH: Our CoCo has music to sooth the savage hacker. It's summer time and the computing is easy, so get in the mood with our June issue. Good golly, Miss Molly, don't you know? It's the Music issue! The sounds of your CoCo can take you on a stairway to heaven when you try these solid-gold musical gems. But, we've only just begun. You'll twist and shout with glee because we have included our usual chorus of useful and entertaining programs.

Of course, that's always been our fortissimo and the key to the RAINBOW's success. So, be sharp and get *the* Color Computer magazine, THE RAINBOW.

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May 1986 Vol. V No. 10

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The Multi-One-Liner Program

Editor:

As much as I enjoy the one-liners, they are a problem if saving to disk. They use up a whole granule even though they do not require it. So I thought the best thing to do was combine them into one program.

It works this way. Start typing the one-liners at 100 and space each one 10 lines. Put a `RETURN` every five spaces after them. Set up an `INPUT` and `ON GOSUB` at 90 and 95. Then create a menu such as 1-Patterns, etc. By entering the number choice, the program jumps to the one-liner and returns if it doesn't get caught in a continuous loop. There are a few things to remember. Some lines call themselves so you must be sure to put in the correct line number. Some one-liners do not end and must be broken into via the BREAK key so you will have to restart the program. You may find a few that might cause a problem if put into a larger program. Those you will just have to leave out.

This method saves a lot of disk space, especially if you save all the programs in an issue.

Robert Toscani
Philadelphia, PA

BACK TALK

Editor:

I agree with Pastor Mark Camp's letter in the March 1986 issue [Page 8] and would also like to hear about people using their CoCos for the Lord's work. I am a church treasurer and have been doing all the bookwork for over a year now with *VIP Calc*. It even prints the checks.

I also use *VIP Database* and *VIP Writer* extensively. The mail merge features are particularly effective for sending letters to the membership. If anyone would like more information, my Compuserve ID is 74156,3374 or on Delphi it's REPNY.

Jim Reed's (March 1986) editorial sounds awfully familiar. Right on, Jim.

Richard E. Pratt
Saratoga Springs, NY

The VCR Connection

Editor:

In the March 1986 issue of RAINBOW, there was an inquiry from John Carstens [Page 6] asking how to interface the CoCo to a VCR. I wanted to make the same connection so I bought Archer Video Selector from Radio Shack for $39. This switcher, mounted with velcro to the side of my TV monitor, is handy to the TV, VCR, CoCo, digitizer, etc. It makes possible the connection of the CoCo to the VCR. To my knowledge, it is the best interface you can find to tie your entire system together.

If you would like more information on the Archer Video Selector hookup, call (717) 388-6776, or write me at R.D. 1, Box 8, 18615. Please enclose a stamped, self-addressed envelope.

George Winterstein
Falls, PA

Phooey on Financing . . .

Editor:

Bill Bernico presents a neat little program in his "Financing: The Economic Advantage" (March 1986, Page 71), however, I feel obligated to point out that one should not just blindly accept the numerical values this program produces. Although the results are accurate the analysis is somewhat incomplete . . .

James W. Stelly
Houston, TX

Editor:

. . . he would have been better off to pay cash for his car and start a new nest egg with his monthly payments. By doing this, one would have $15,494.28 in the bank at the end of the 48 months, $1,321.61 more than he has by following Mr. Bernico's advice (with all figures based on monthly compounding).

Richard T. Behrens
Boulder, CO

Editor:

. . . If you pay cash, you do not have to pay $270.76 each month for four years. Put this much money each month in that same 8.75 percent interest savings account and your savings will total out to $15,494.28. That's much more than you would have in the account had you simply left the $10,000 in there for the four-year period. I used the *Personal Savings* program by Edward Carson from the November 1984 [Page 132] RAINBOW to make these calculations.

Mike Knolhoff
Sterling, IL

Editor:

Mr. Bernico made a logic error, not a program error, in writing his *Cash vs. Financing* program. . . . when someone claims you gain money by borrowing money at a high rate of interest and investing at a low rate, I would think this might raise an eyebrow or two. That's like finding the elixir of life!

James M. Wright
Pittsburgh, PA

Editor:

. . . The math is correct and the salesperson has not lied. However, you have been misled by focusing on the interest cost. The focus should be on assets at the time the loan is paid off . . .

Milton D. Mobley
Tacoma, WA

Editor:

Bill Bernico's program has much value and requires only little adjustment to be a very useful program. In this case, however, a buyer would be wiser to pay cash for the car and start a new savings account in the amount of $270.76 each month. In Bernico's example, the spread in interest rates is too large to favor financing.

Where did he go wrong? Bernico's error was in not considering the "opportunity cost" concept with which financial advisors and economists are always concerned. Specifically, he overlooked an alternative opportunity available: consideration of the earning potential of a monthly $270.76 investment.

R. Scott Boaz, Ph.D.
Southern Arkansas University
Magnolia, AR

. . . An Incomplete Analysis

Editor:

Since my *Cash vs. Financing* program appeared in the March 1986 issue, I have received several letters from readers. Their tone ranged from "Oops, Bill, you made an error in logic" to "Help! Police! Fraud!" While I respect everyone's right to their opinion, I don't think I deserved some of that criticism.

My purpose was not and is not to try to make anyone part with their money. I admit I made an error in logic by not fully explaining that this program explored only one avenue of financing. I do not claim to be a financial wizard, just a CoCo enthusiast who likes to program. I came upon the two formulas for this program in a book from my local library. After experimenting with them for a while, I decided to combine them in a single program as a comparison. The result was an incomplete analysis.

I'm sure there are a lot of people more familiar with finance who perceived that program as an attempt to deceive people into financing rather than paying cash. Explicit examples have been brought to my attention proving just the opposite to be more beneficial. What my program didn't go into was all the variables and extenuating circumstances associated with financing. While each of my formulas was correct and workable separately, they didn't show the entire story behind comparing the two methods. For this oversight I apologize.

Human nature being what it is, I can understand why people are quick to point out mistakes but slow to praise for something well done. While I've received dozens of letters and phone calls from people who've enjoyed my past programs, I can't help but think that I may have let a few readers down. In the future, I will stick to areas where I'm a little more sure of myself.

Bill Bernico
Sheboygan, WI

Teaming up for Adventure

Editor:

Is there anyone out there who has a good Adventure idea (scenario), but can't put it in a program?

I have enough knowledge in BASIC to write a program, but lack ideas. Please send a detailed explanation of your idea, and together we'll produce a great Adventure. My address is 939 S. Harriet, 46151.

Jim Cockrum
Martinsville, IN

HINTS AND TIPS

Editor:

I recently purchased the Radio Shack *Micro Illustrator* program Cat. No. 26-3278. There was no mention either in the catalog or in the instruction manual that OS-9 was required for this program. It worked fine until I tried to save a picture to disk. I then learned that I must have an OS-9 formatted disk to use with the *Micro Illustrator*. It seems like a great graphics program, but if I want to use it with *Telegraphics* or any other screen dump program that I already have, I am out of luck.

It seems to me an OS-9 requirement should be clearly stated on the outside of the package. Perhaps your readers would appreciate being warned about these unstated requirements.

Robert L. Wallace
New Philadelphia, OH

Control Key Patch

Editor:

This is a patch to use the CTRL key on the $4.95 keyboard Radio Shack was selling with *Keyboard Shorthand* in RAINBOW, February 1984.

Add two new lines to the source code:

```
1012 CMPA #$BD *Don't allow ctrl key to
1014 BEQ  WAIT *print a = to the screen
```

And change this line to read:

```
1190 ANDA #$40 *Ctrl key pressed?
```

This allows you to use the control key instead of the down-arrow key.

Milt Webb
Jacksonville, FL

A Better Way to Type in Listings

Editor:

This is in response to a letter submitted by Charles Roman of Bellaire, Ohio. In the January 1986 issue of RAINBOW [Page 8], he described his method of entering listings into his computer with the use of "Post-it" notes. He might like to consider another method.

Needlework people, especially embroiderers, use a metal plate about 8 by 10 inches behind their graph and place magnetic strips both up and down to keep track of where they are on the graph. They move the magnetic strip as they proceed.

You might go to a needlework shop that caters to embroiderers. When I purchased mine, they had to order it for me. I have found it most helpful.

Theresa Kelly
Seattle, WA

Tips Abroad

Editor:

Gord Lewin's article "How To Figure Foreign Currency Exchange Rates," RAINBOW, March 1985, Page 161, has proven to be extremely useful. In order to obtain a more precise printout, I modified Line 250 by adding `.##` to the print format. This allows both dollars and cents to be printed, as currency exchange rates are usually fractional.

Anyone calling Delphi from Ontario, Canada can get through on Tymnet's Toronto trunk line. Call (416) 364-9620 and follow the Tymnet instructions as they appear in the Delphi advertisement in THE RAINBOW. This line supports XMODEM protocol and is free of charge. Delphi also has a Toronto line at (416) 881-8650, again at no charge.

Would anyone who knows of a graphics dump program that works for the Mannesman Tally Spirit 80 please get in touch with me at 30 - 1400 Mary Street N., Canada L1G 7B6.

Carl McEachern
Oshawa, Ontario

REQUEST HOTLINE

Editor:

My wife and I have recently taken over the management of a small 20-room motel operation. We would like to use our TRS-80 Color Computer for as many applications as possible.

We have been searching for a program that would let us use our system for front office registration of our guests. The program would need to be a calendar that would list by the month, week and day the following information: guest's name and address, room number, arrival and departure dates, room type, and amount and form of payment.

We need this type of program so we can see at a glance what rooms are reserved or occupied on a given day. Any help would be most appreciated. Write us at 221 Vine Street, Apt. 42, 19106.

Harry B. Koplin
Philadelphia, PA

Pedigree Program

Editor:

I hope you or one of your readers can help me locate a program for the Color Computer for rabbit pedigree/herd management. It is available for many other computers but not the CoCo. Any suggestions would be helpful, even the recommendation of a program that could be adapted for this purpose. Write me at R.R. 1, Box 294, 46031.

Sarah Teuscher
Atlanta, IN

Coin Collecting

Editor:

Please inform me of the availability of a cassette program that could be used to keep an inventory of a small coin collection, which my grandson has. Or, perhaps a printed program might be available somewhere that I could use on my 64K Color Computer 2. My address is 202 Wembridge Drive, 13057.

Robert Frankis
East Syracuse, NY

Anyone for a Little Packet Radio?

Editor:

I would like to contact any readers of RAINBOW who are using their CoCos for packet radio communications. I would be glad to hear from others who would like to try packet radio. Please write to me at 5131 Raywood Lane, 37211.

Brian Carling
Nashville, TN

Wishing for a CoCo Wrestling Match

Editor:

I am a wrestling fan and I would like to know if any company has plans to make a wrestling game for the CoCo. Since Diecom Products made four of the popular arcade games (two of which are karate and boxing), they might make one of the arcade wrestling games.

Greg Tarczynski
Chicago, IL

Editor:

I need help in locating a progr
can use with my part-time bu
a 64K Color Computer, on

cassette player and a Radio Shack DMP-130 printer. I do not know how to program and do not have the time to learn.

My part-time business is as a beauty consultant and manager. I need a program that will allow me to enter the order form once and then check off the items purchased by a customer at each show. I would then like to be able to have the orders totaled, tax added and the discounts figured in. I also need to file these orders by customer's name, address, phone number, what products she ordered and on what date. Another option needed is to be able to keep track of my expenses, earnings and sales. I need to be able to keep track of the sales of the girls on my staff as well as a calendar of shows for both myself and my staff.

At present, I am using my computer primarily for word processing using *Telewriter-64*. My full-time job is as a social studies teacher, and I would appreciate any suggestions for a program that I could use for tests with a variable number of true/false, multiple choice, matching and discussion questions. I could also use a program that could be used as a grade book, keeping grades by numerical grades for six weeks, keeping that average for three six-week periods and then keeping a semester average. I need to be able to get a hard copy printout during the six weeks showing the average to that point, as well as at the end of the six weeks, semester and the year.

Call me at (804) 541-8170 after 4 p.m., EST, or write me at 8915 Teakwood Drive, 23842.

Ellen R. Rusnak
Disputanta, VA

Editor's Note: See "Expense Tracking and Management" on Page 122 of the March 1986 Business/Finance Issue. Maybe this program can be of some help to you.

INFORMATION PLEASE

Editor:

I have just purchased a Radio Shack FP-215 flatbed plotter at a substantial savings. My concern is that there is no commercial software to drive this for the CoCo, and was sure someone could provide some help. Write to me at P.O. Box 14, 28706. Note: all programs in the manual work with the CoCo if you substitute the `'?#-2,"'` for `LPRINT`.

Harvey Lindsey
Balfour, NC

Apple Lags Behind

Editor:

I have just purchased a Dragon 64 computer and am interested in getting a schematic and I/O related memory map for it. The Dragon appears to be basically the same machine as the CoCo and I would like to know if anyone out there has had any success with making them more compatible. I have a 64K CoCo at home and I love it; I sold my Apple because it couldn't keep up with my CoCo. My address is PSC 1, Box 7205, Yokota AB, Japan, 96328.

Stephen Blair
APO San Francisco, CA

Code for Condensing

Editor:

In your January 1986 issue of RAINBOW, Page 210, there is a one-liner program called *Labeler*. I am using a CoCo 64K model #3127 and a DMP-105 printer. The program works just fine. My question is, what changes can I make to have the printing in either condensed or compressed type instead of standard print?

Harry Marcus
Las Vegas, NV

Editor's Note: Check your printer manual to find the codes required to accomplish these styles. Then just add lines at the beginning of the program, such as:

```
PRINT#-2, CHR$(X)CHR$(Y)
```

where 'X' is the escape code (27) and 'Y' is the code for what you want the printer to do.

Editor:

Can you tell me where I can find a tape to disk program for my CoCo?

E.R. Dillon
Huber Heights, OH

Editor's Note: See "A Tape to Disk Transfer Vehicle" by Roger Schrag on Page 48 of the January 1984 issue.

Cat in the Contents

Editor:

If anybody knows of a FORTRAN program for the CoCo please drop me a letter at Station A, Box 172, 39470.

I would like to thank you for adding the "CoCo Cat" to the Table of Contents.

Joe Polk
Poplarville, MS

Editor:

Does anyone know how to make the *CoCo Max* work with the PBJ, Inc. *C-C Bus* (multipack)? The phone number listed for PBJ is disconnected.

Roger Alexander
Bellingham, WA

Editor's Note: The new phone number for PBJ, Inc. is (201) 523-8663.

Telling it Like it is

Editor:

I have owned my CoCo for four years, have the premier issues of several CoCo magazines and have read RAINBOW all during that time. I have agreed and disagreed with many things I have read but never have I so totally agreed with anything until I read Mr. Reed's column, "Building March's Rainbow." In a few words, Jim has said it all about why we are what we are and how we got here. Just as articulate was his appeal to Tandy. Perhaps this should be the start of a campaign to get Tandy to do something about a new CoCo before the fast-moving, high-tech world leaves them behind!

Thanks, Jim, for saying what we all feel!

Larry R. Cadman
Monroe, MI

Editor:

Your March 1986 article [Page 16], "Building March's Rainbow," really hit the button . . . my problem is in having time to run any software between all the mods that are underway.

John C. Burke
Fremont, CA

KUDOS

Editor:

Like many readers I have learned most of what I know about computers from my CoCo and from the many great articles that have appeared in THE RAINBOW. When I first started, many of the programs and articles in THE RAINBOW were "way over my head." Well, now that I have become proficient in BASIC and speak fluent *EDTASM+*, I find going back to those early issues a real *bonanza*. I constantly re-read every issue I have and continue to discover new information. Take it from me, don't let your old RAINBOWs gather dust. Read 'em again and again and again.

Here is a bright screen POKE that works on my Disk extended BASIC 1.1 CoCo.

```
POKE 359,57:SCREEN0,1
```

This POKE allows you to remain in this screen mode and continue programming, etc. Thank you for a fine magazine.

Milt Webb
Jacksonville, FL

Laudation to the Lamonicas

Editor:

My wife bought our CoCo as my Christmas gift. I was a bit bewildered at first, but now I can't stay away from it. I am certainly enjoying the programs submitted by Mary and Jim Lamonica. Our children are using the math program they submitted ["CoCo Math Class," January 1986, Page 88], and the results are phenomenal! Please present more of the Lamonicas work when possible.

Robert Miller
Beaverton, OR

Dazzled by the CoCo Crowd

Editor:

The three years I have had RAINBOW I have been dazzled at all of the programs people send in. I would like to congratulate them and tell all of you CoCo users out there — keep it up!

Chris Curtis
Walling, TN

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Looking for *Music's* Documentation

Editor:

Before I had a chance to try out a new *Music* plug-in cartridge, the little documentation booklet was lost. Tandy has discontinued this item and the local dealers are unable to obtain any information on it. If you or any of your readers could help me get a copy to buy outright, rent or loan, it would be much appreciated. I might even share some royalties from my first published composition. The catalog number of the cartridge titled *Music* is 26-3151 and I suppose the booklet I lost has the same number. Your reply is anxiously awaited at 2402 West 16th Street, SP. G-9, 85364.

Norman Drummond
Yuma, AZ

PEN PALS

Editor:

Anyone who would like to be pen pals please write me at 741 Alicia Walk, Apt. E, 44306.

Keith Selbee
Akron, OH

- I am 16 years old and looking for CoCo users around the world who would like to be pen pals. Please write to me at 425 Indiana Avenue, 44420.

Melissa Arquilla
Girard, OH

- I am looking for a pen pal, someone to write letters to. My address is Rt. 2, 73086.

Brandon Knight
Sulphur, OK

- Anyone interested in joining a pen pal club called "The Super K Club" may do so if you have an MC-10 or CoCo 2 with memory between 4K to 64K. You must have a cassette recorder. My address is 136 S. 15 Street, 18042.

Nevin Keller
Easton, PA

- I am interested in getting a CoCo pen pal. If anyone is interested, I am 18 years old and have a 64K CoCo 2, disk drive and DMP-105 printer. My address is 2081 Marshland Drive, 29407.

Ron Clifton
Charleston, SC

- I would like to have a few pen pals. If you would like to be one, I have a 64K CoCo 2 with tapes. My address is Rt. 3, 104 Jimy Lane, 75662.

Henry Harvey
Kilgore, TX

Henry, Meet Michael

- I am looking for a pen pal. I have a 32K CoCo 1 with a disk drive or tapes. My address is Rt. 1, Box 268H, 75662.

Michael Mitchell
Kilgore, TX

- I am 12 years old and would enjoy having pen pals in such places as Canada and Australia, and places away from where I live. I would also enjoy hearing from people locally. My address is 627 N. West, 79065.

David Cumpston
Pampa, TX

- I would enjoy corresponding with all CoCo nuts out there. I can be reached at Rt. 1, Box 63A, 76076.

Rick Bullon
Poolville, TX

- I am looking for another CoCo user (any age) that would be interested in being pen pals. I am 14 years old and have a 64K ECB with drive, recorder and printer. My address is 751 Morning Glory Lane, 53511.

Paula Vaske
Beloit, WI

- I would like a pen pal no older than 13. Must know a little about computers. If interested, please write to me at 11763 82A Avenue, Canada V4C 2E5.

Don Ellis
Delta, British Columbia

- I am interested in finding a computer pen pal. My address is P.O. Box 176, Canada V0X 1H0.

Shawn Welles
Cultus Lake, British Columbia

- I am interested in being pen pals with any CoCo users in the world. My address is 1475 Main Street West, Canada L8S 1C9.

Norm Van Bergen
Hamilton, Ontario

- I would like to correspond with Color Computer users in other countries. I use a 64K CoCo, a CCR-81 recorder and a DMP-110 printer. My main interests are in utilities, databases, spreadsheets and any application programs that use the CoCo to its potential.

Jim James
P.O. Box 1362
Orange, New South Wales
Australia 2800

- I have a 16K Extended BASIC CoCo 2 and Tandy FD-500 disk drive (I intend to expand to 64K in the near future). I am interested in corresponding with someone with the same setup.

W. Boardman
P.O. Box 29
Port Lincoln, S.A.
Australia 5606

- I am interested in having a pen pal in America, especially those who play Adventure games. I am 40 years old.

Dave Hansch
38 Sandells Road
Tecoma, Victoria
Australia 3160

- Anyone interested in having a pen pal in Australia please write to me.

Pen Pal
7 Graham Street
Innisfail, Queensland
Australia 4860

- I'm Brazilian and a new RAINBOW reader. I own a CoCo 2 with 64K ECB and I'm looking for CoCo (or compatible) owners in the U.S.A. or anywhere.

Anthony Fernandes Lima
Avenida Atlantica 538/101
Leme, Rio De Janeiro, R.J.
Brazil 22010

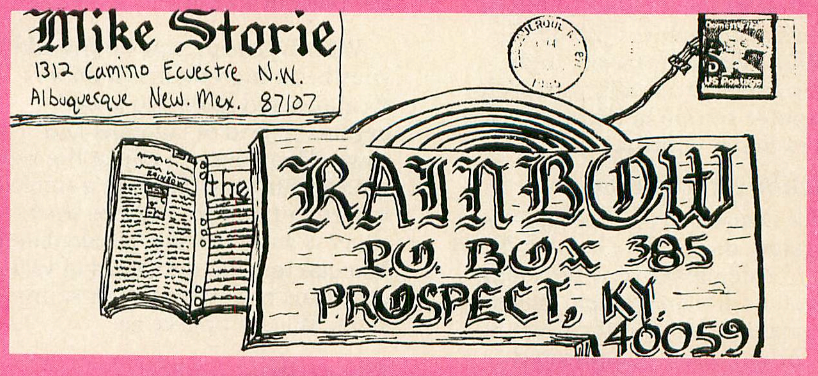
- Please print my name and address for any CoCo owner who would like to get in touch and be pen pals.

Herman Aalderink
N0JN/DU7
536 Tinaan, Naga
Cebu, Philippines

THE RAINBOW welcomes letters to the editors. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or space.

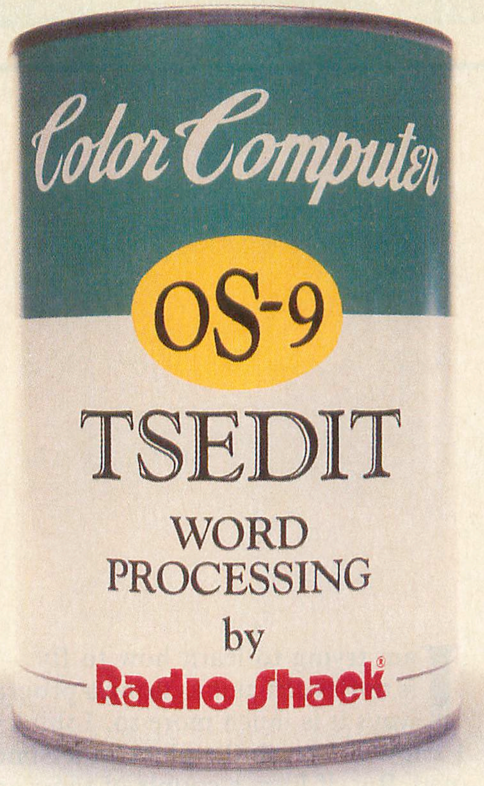
Letters to the editors may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`.

ARTS AND LETTERS



Envelope of the Month

Mike Storie
Albuquerque, NM



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I am trying to learn how to fly — airplanes, that is! In some ways, it is not as difficult as using a program like *Worlds of Flight*, but in other ways it is much more so. I think what really makes it different is that I know if I crash the plane in a Simulation on my CoCo, I can just start over. But, if I am a couple of thousand feet in the air in a Cessna 172 and crash, that isn't a Simulation and I can't restart it.

So far, I have managed to keep from a "crash and burn" (as my flight instructor puts it), but that is about all I can truthfully say. Yet, another part of this learning-to-fly project has been almost as interesting as the flying itself, and that is the ground school.

Ground school meets one evening a week for three hours and that is where we learn the non-flying basis of flight. I like ground school because it gives me a chance to meet other people who have the same experiences as I do, and that way I find out I'm not all thumbs at the controls of the plane itself.

Some of the main things one has to learn at ground school are how to read different kinds of charts, how to compute various things and understand what makes a plane fly. The FAA requires pilots to know all these things and tests them on it.

One of the more fearsome aspects of ground school's first month is the famous "weight and balance" problem. Without getting into a lot of detail, weight and balance is simply making sure that all the things a plane carries — fuel, oil, pilot, passengers and luggage — neither exceed a certain weight nor are placed improperly in the aircraft to make it difficult (or impossible) to control it.

Weight and balance problems concern things I've never heard of: moments and arms. And, also some things I have heard of: pounds and center of gravity. There are some fairly complex calculations here and the first couple of times I did them, it was with a paper and pencil.

My arithmetic skills remind me of the sign on the back of the 18-wheel truck going up a 40-percent grade on a two-lane road. The sign reads: "I may be slow, but I'm ahead of you." My arithmetic may be slow, but it usually gets me there.

Slow bothers me, so I got a "formal" pilot "computer." That is really a misnomer, because pilots call almost anything that will do problems in mathematics a "computer." This is actually a hand-held calculator.

The calculator does have two advantages. First of all, if you tell it what kind of problem you want to solve, it prompts you on a little LCD screen for what sort of value to enter. Second of all, it is approved for the FAA written examination.

Telewriter-64™

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THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
>
> — Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

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Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

RAINBOW
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File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
>
> — The RAINBOW, Jan. 1982

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After working out a couple of these weight and balance problems by hand to be sure I understood them, I "graduated" myself to the calculator. I punched in various data, and after a couple of seconds, out came the answer.

A couple of seconds?

Yep.

Darn. I guess computers have spoiled me. It sure seemed like a long time for just a simple calculation. So I programmed a CoCo to do a weight and balance problem — in BASIC.

The answer popped up almost instantly.

Which got me to thinking, first of all, that it is a shame I can't take the CoCo to the FAA exam with me. It does these calculations so much more quickly. And then it got me to thinking about speed as a relative thing, anyway.

Something like 15-18 years ago, I bought a hand-held calculator for $50 that would add, subtract, multiply and divide. It didn't even have a "clear error" key. But I thought it was the greatest thing since sliced bread. A year later, I was able to get a hand-held for the same price that did basic math, had two memories, did square roots and the like, and had a clear error key. It was also faster.

I'll save you the tortuous story of all the calculators I bought, each one with a few more features, before I finally bought a CoCo. And, likewise, I'll also save you going through the numbers of computers upon which I have laid my fingers since my first Color Computer came to live with me. But, suffice it to say, all have represented increases in speed, more or less.

> ***". . . I have to wonder what price speed."***

With the exception of the MacIntosh, which is so slow as to be almost painful, I have to wonder what price speed. One of the computers here is a Tandy 3000 — an IBM AT look-alike that is, in fact, 33 percent faster than the AT. It recalculates huge spreadsheets in the wink of an eye. But how essential is it that it be all that fast? Frankly, the 3000 is only a couple of seconds faster with Microsoft's *Multiplan* than the CoCo is with *Elite Calc* or *DynaCalc*. How important are those couple of seconds?

I happen to think they are not all that important in the greater scheme of things. But maybe I am wrong. I remember a "great debate" on these pages a couple of years ago when two sides argued for months whether we really needed more than 32K.

I do not have the answer. But I'd like to have your opinion. Please write if you'd like to have your say. I think it would be interesting — for all of us.

I wonder how many of you have seen the very newest CoCo — the one where the logo of the Color Computer has undergone a slight change. Tandy seems to have decided that it will henceforth change the little red, green and red rectangles into little parallelograms. Or are they arcs?

If arcs, do they, as someone pointed out to me the other day, look suspiciously like the beginning of a rainbow stretching upwards?

Just wondering.

— Lonnie Falk

The Coco Greeting Card Designer

The Coco Greeting Card Designer can be used to design and print custom Greeting Cards for all occasions including: Valentine's Day, Birthdays, Mother's Day and more.

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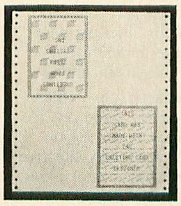

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SEPTEMBER 1984 AND MAY 1985

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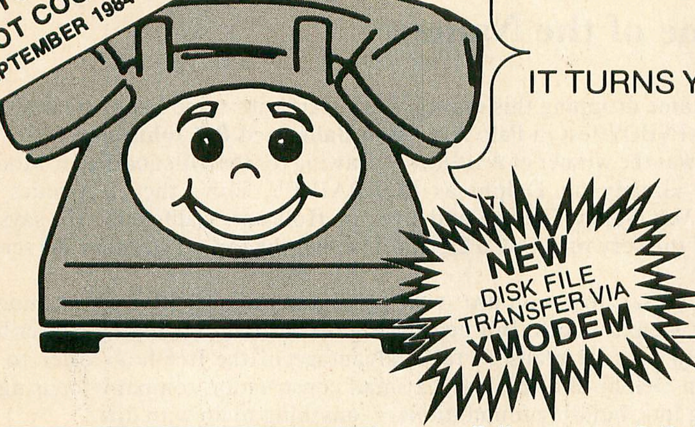

GOOD LOOKIN'

AUTOTERM shows true upper/lower case in screen widths of 32, 40, 42, 51, or 64 characters with no split words. The width of 32 has extra large letters. Scrolling is forward, backward, and fast. Block graphics pictures are displayed automatically and can be scrolled.

The screen's top line shows operating mode, unused memory size, memory on/off, and caps-lock on/off. It also gives helpful prompts.

SWEET TALKIN'

KEY-BEEP can be on/off. Unacceptable keystrokes cause a lower pitched BOP! This ERROR-BEEBOP can be on/off.

Talks to other computers with Full or Half Duplex; Baud Rate of 110, 150, 300, 600, 1200; Parity as even, odd, mark, space, none; 7 or 8 bit Word; any Stop Bits; all 128 ASCII characters; true line Break; XON/XOFF protocol; and optional line-at-a-time transmission. Able to send and receive text, block graphics, BASIC and ML programs. A 64K machine holds up to 45,000 characters (33,300 in HI-RES).

DUAL PROCESSING lets you review & edit while more data is coming in.

XMODEM for disk file transfer.

Fully supports D.C. Hayes and other intelligent modems.

Talks to your printer with any page size, margins, line spacing, split word avoidance. Embed your printer's control sequences for boldface, underlining, etc. Narrow text can be automatically spread out.

You'll also use Autoterm for simple word processing and record keeping

You can display directories, delete files, transmit directly from disk, and work with files larger than memory. Easily maintain a disk copy of an entire session.

Compatible with TELEWRITER (ASCII) & other word processors.

SMOOTH WALKIN'

AUTOTERM moves smoothly and quickly between word processing and intelligent terminal action. Create text, correct your typing errors; then connect to the other computer, upload your text, download information, file it, and sign-off; then edit the received data, print it in an attractive format, and/or save it on file.

Editing is super simple with the cursor. Find strings instantly, too! Any operating parameter, such as screen width, can be altered at any time. Uncompleted commands can be cancelled.

PUTTY IN YOUR HANDS

The word processor can be used to create, print, and/or save on file your personal KSMs. They let AUTOTERM act like you. For example, it can dial through your modem, sign-on, interact, perform file operations, & sign-off; an entire session without your help. KSMs can answer the phone, prompt the caller, take messages, save them, hang-up, and wait for the next call. The KSM potential is unbelievable!

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Graham, *RAINBOW*, 6/83

"The AUTOTERM buffer system is the most sophisticated — and one of the easiest to use..."
Banta, *HOT CoCo*, 9/84

"Almost a full featured word processor..."
Ellers, *RAINBOW*, 11/84

"AUTOTERM's excellent error-handling routines, thorough documentation, and logical, easy-to-use command structure make it stand out."
Parker, *HOT CoCo*, 5/85

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* MOVE COMMAND: Move one or more statements in a program
* FIND COMMAND: Find a string and REPEAT FIND for string.
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* SCROLLING: Allows for down or up scrolling through pgm.
* AUTOMATIC EDIT: You can enter edit of current line without specifying the line number.
* COMMAND KEYS: One keystroke enters most basic commands.
* REPEATING KEYS: Auto repeat.
* AUTOMATIC LINE NUMBERING: Set start and increment.
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* KEYBOARD CLICKER: ON/OFF
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BUILDING MAY'S RAINBOW

The Game of the Name

A bit of name dropping this month. Let's start with some happy names from our RAINBOWfest in Palo Alto: **Bob Bailey** and **Bill Johnson.**

Bob was the winner of RAINBOW's drawing for the Mitsuba Super Modem 1200 and he's already on Delphi as BOBBAILEY. Bob's the electronics lab supervisor at West Valley College and lives in Hollister, California. He says he "bought one of the very first CoCo 2s, and I've had the top off so often the screws won't stay in."

Bill Johnson of San Jose won RAINBOW's give-away of a 300 Baud Volksmodem donated by the Delphi booth. Bill became elgible for the drawing by subscribing to RAINBOW and says he plans to take advantage of the free-hour offer to get acquainted with Delphi. Bill, 27, owns a small construction company focusing on "roads, parking lots, building foundations — anything to do with dirt."

So many have made the Delphi connection and joined us on RAINBOW's CoCo SIG that I've decided to name names. There is something intriguing about Delphi's "usernames," the one-word nicknames you select as your identification when first signing on. Many choose to run together their real name, as do BILLBARDEN, BRIANLANTZ and MARTYGOODMAN. **Bob Rosen**, on the other hand, is WHIFFLE and **Steve Bjork** is 6809ER.

Many usernames sound like C.B. radio "handles," while others sound more like boat names and some like secret agent code words. Some are self-evident selections such as JUSTMARRIED (**Mark Waite**), MICROTEACHER (**Don Bainter**) or BUSDRIVER (**Felix Pendas**), but others are cryptic indeed: DISKBANK (**William Borie**), ZARATHUSTRA (**Jay Browning**) and OLDUTCH (**George Quellhorst**). Many conjure up adventure: TIMERIDER (**David Bischof**), AQUALUNG (**Gary Adams**), TRAILBLAZER (**Walter Janusz**), MOONRAKER (**Danny McClain**). But you can't get more "down home" than MUDFLAP (**Roger D. Bradley**) or UGLY (**Keith W. Smith**). GREENONION (**Dave Scallion**) had better watch out for YARDMAN (**John Gates**) or WEEDHOPPER (**Joe Houseright**), and we'll all give a wide berth to POLECAT (**Bill Watkins**).

Now, ADOBEPAGODA could be either **Becky** or **Dave Matthews** and both **Sandy** and **Charles Allen** go by RAILFAN, but the BOSSMAN is strictly **Paul W. O'Reilly** and only **Donnie Ashley** is NUKEBOSS.

Maybe we should consult our COCOSHRINK (**Frank Miller**) to counsel the MADDUNKER (**Nate Grant**), BUGMAN (**Harold Dowda**), BONEHEAD (**Brian Frumolt**) and RUNAWAY (**John Duffy**). Sounding more violent are CHICKENHAWK (**Jim Laffen**), HOGWILD (**Steve Philip**), ZOMBIE (**Rod Plant**), CHAINSAW (**Kevin McCullough**), KARATE (**Shawn Corcoran**) and MAKEMYDAY (**Ed Hartmann**). Wonder if HORNTOAD (**Larry Herdenbrook**) has met BULLFROG (**David Stafford**)? It would appear that SIXPACK (**Charles W. Currier**), SUPERPIZZA (**Tony Wyland**) and BIGCHEEZE (**Wilbur E. Kraft**) should have a natural affinity, too.

Now, is ELECTROMAGIC (**Devin Cook**) in the air as FATIMA (**David Agopian**) dances while FIDDLER (**David Souter**) plays? And, does FOLKSINGER (**Harry Hedges**) or JAZZMAN (**Raymond Gassaway**) have the next act? Ham radio call letters abound as does COCO (*you name it*). **Tim Coldenhoff** may be the MASTERMIND, but then **Stephen Ritger**'s a WIZBANG. And, while **Duke Mihajlovic** is THEDUKE, **Lance Bannerman** is a STARCOWBOY, too.

WOODSTOCK (**Dave Wood**) should feel right at home with SNOOPYDOG (**Billy Hambric**) or BEAGLE (**Tom Heagle**), and BILLTHECAT (**Lou Case**) must be a cousin to CATMAN (**Peter Schweitzer**), CATLOVER (**Clayton Hayes**) and CATFISH (**Gordon Daniels**). From WALLSTREET (**Fred E. Simpson**) to the WESTCOAST (**Cindy Shackleford**), THEBIGGUY (**Mike Carr**) to NEWKID (**James McDaniel**), OLDGROUCH (**Carl Wolf**) to HAPPYPUPPY (**Steve Araujo**), RAMBO1 (**Albert Veillette**) to RAMBOXVII (**Brad Bauer**), RAINBOW's CoCo SIG obviously has a MEGABYTE (**Mark E. Sunderlin**) of the RIGHTSTUFF (**Jerry Bradley**).

You can get in on all the name dropping, too. Just drop your name in the mail for a RAINBOW subscription and we'll print it 12 times, right on the cover of your favorite magazine! What more could a CoCo lover ask for?

— Jim Reed

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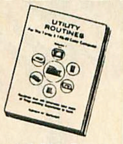

This powerful book for Basic and ML Programmers, includes program explanation, memory requirements, and an annotated source listing for the utility routines given below. These routines if bought individually will cost you HUNDREDS OF DOLLARS.

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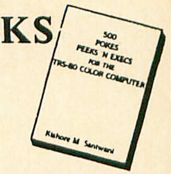

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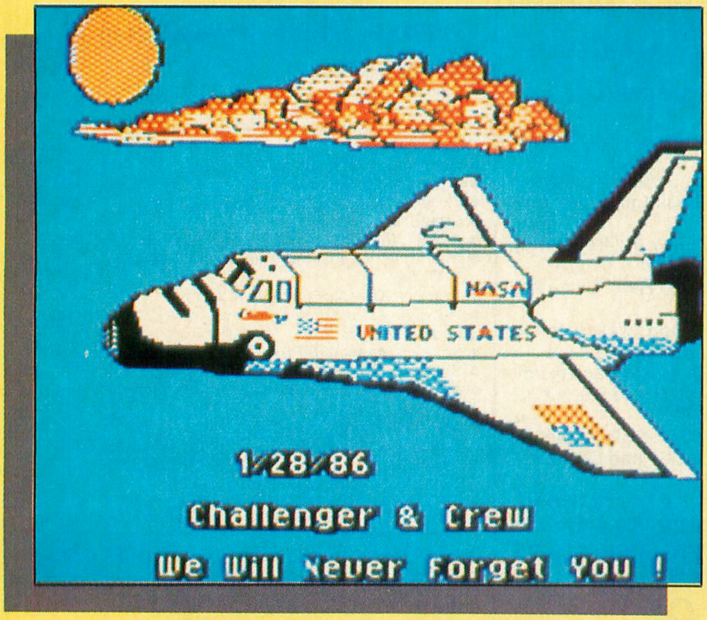
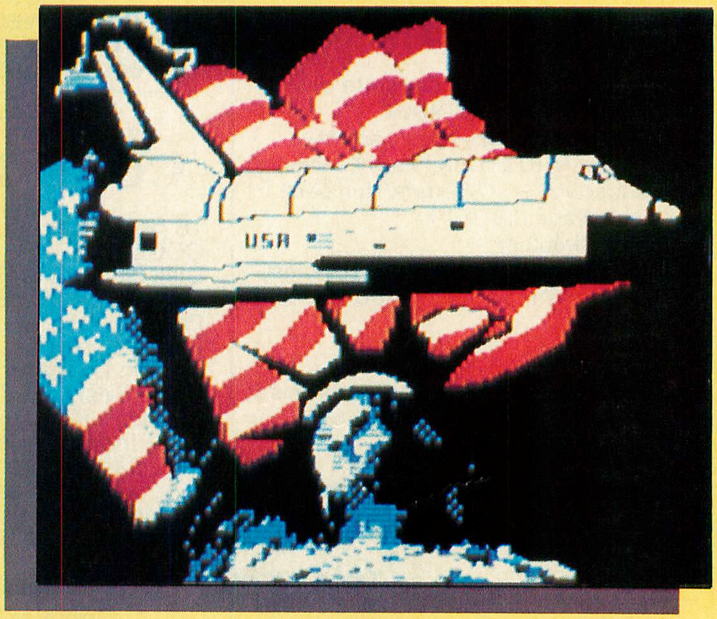
The CoCo Gallery

The theme of this edition of CoCo Gallery is a tribute to the human spirit. Nowhere is humanity's quest for knowledge more evident than our willingness to take to the sky.



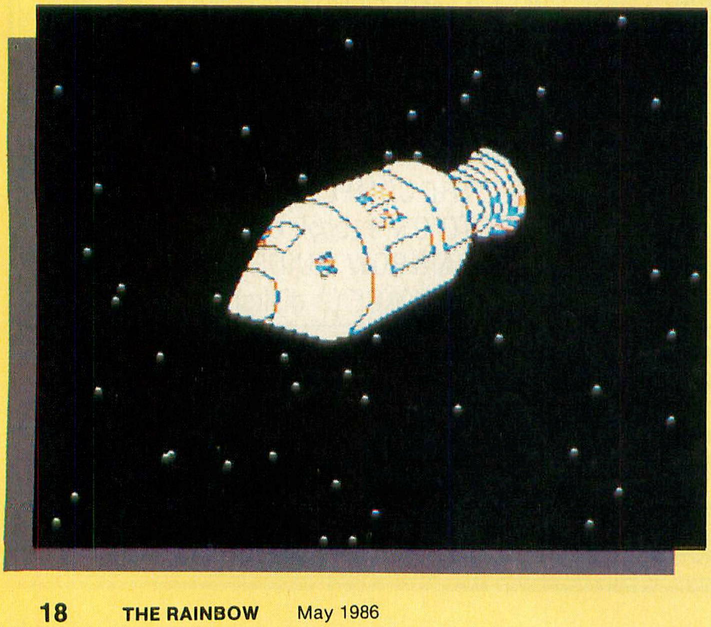
1st PRIZE

Logan Ward
Challenger
Logan opens our gallery with heartfelt homage to the Space Shuttle Challenger and its brave crew. Logan lives in Memphis, Tennessee, and used *CoCo Max* for this picture.



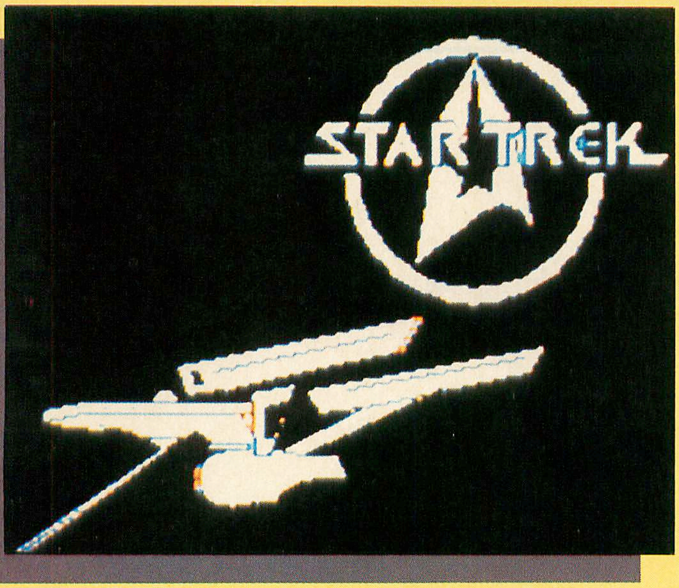
2nd PRIZE

Edwin Hathaway
Memorial
Edwin lives in Glendale Heights, Illinois, and used *CoCo Max* to create a stirring illustration of the Space Shuttle Challenger as we wish to remember it.



3rd PRIZE

Chris Foster
Apollo
Chris lives in Texarkana, Texas, and continues our theme of exploration with a historical depiction of one of the Apollo spacecrafts. Chris used a BASIC program he wrote for this work.

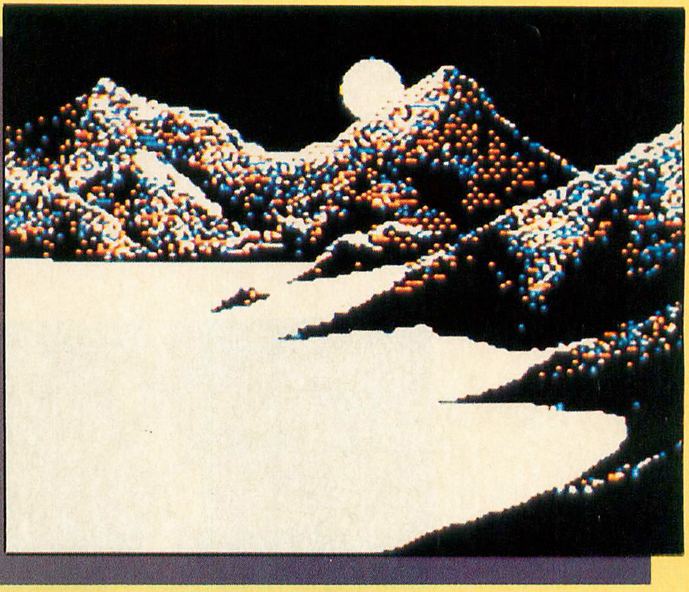


HONORABLE MENTION

Thomas M. Ales

Star Trek

Our first honorable mention goes to Thomas Ales, who lives in Neenah, Wisconsin. Using BASIC, Thomas created a work taken from popular fiction that must be included in our proud and bold gallery.

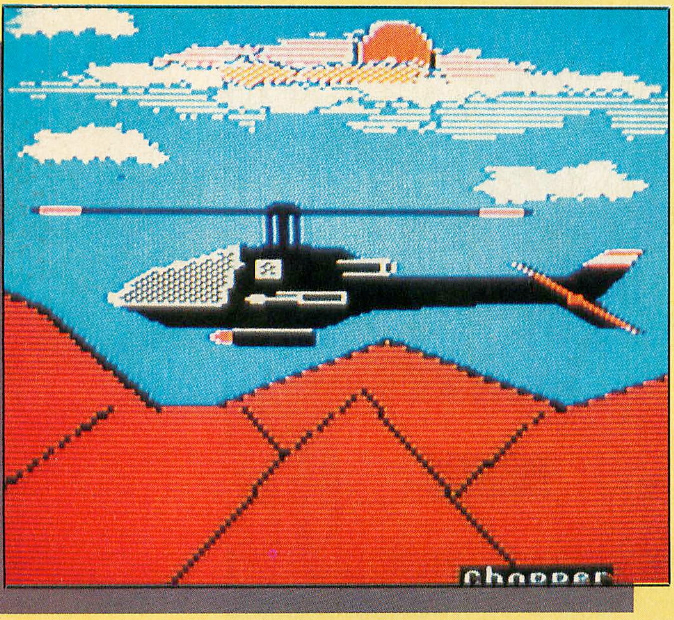


HONORABLE MENTION

Kenneth Hill

Lunascape

This imaginative work by Kenneth Hill of Severna Park, Maryland, depicts a scene long striven for, finally reached and fondly remembered. Kenneth used *X-Pad* for this picture.



HONORABLE MENTION

Kevin Dorsey

Chopper

Kevin Dorsey lives in Louisville, Kentucky, and rounds out our gallery with a depiction of a sleek military chopper. Kevin used *McPaint* for this work.

SHOWCASE YOUR BEST!

You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community!

Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere.

We will award a first prize of $25, a second prize of $15 and a third prize of $10. Honorable mentions will also be given.

Monica Dorth, Curator

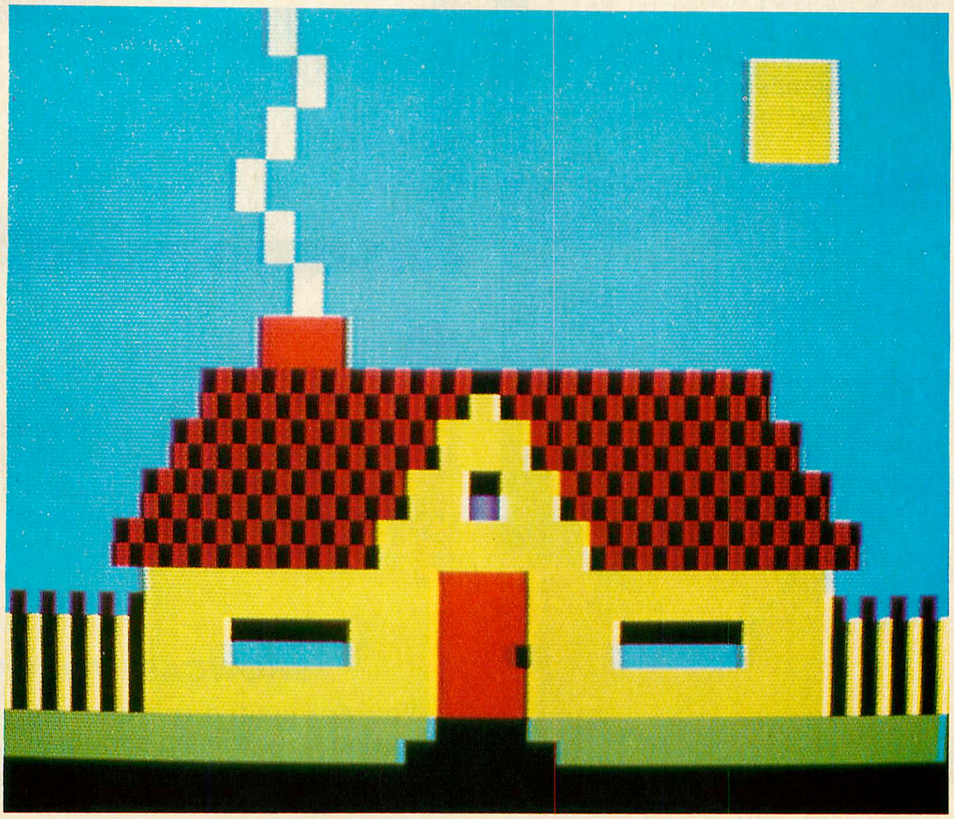
In the April 1986 issue of THE RAINBOW, two graphics in "The CoCo Gallery" listed as second and third prizes, respectively, have been disqualified as not being original works. Our apologies to Gary Larson, creator of *The Far Side*, and Chronicle Publishing Company which publishes Mr. Larson's *The Far Side 1986 Off-The-Wall Calendar.*

16K
ECB

Be it ever so humble, we all know there's no place like . . .

Home Sweet Home

By Ruth E. Golias



Since I bought my CoCo, it has become my only hobby. I am particularly intrigued by the `PRINT @` statements and their many possibilities. These statements seem among the easiest for the new programmer to understand.

This program, *Home Sweet Home*, uses the `PRINT @` statements to build a house. I like the effect. It's rather like an abstract painting.

Just `CLOAD` *Home* and run it to see the surprise at the end.

(Any questions regarding this program can be directed to the author at 2826 Pacific Coast Highway, Torrance, CA 90505, phone 213-325-1384. Please enclose an SASE when writing.) ☐

Ruth Golias has retired from the Torrance Police Department where she did microfilming. She is learning to program her CoCo and it has become her hobby.

The listing: HOME

```
1 '*******HOME SWEET HOME*******
2 '            BY
3 '    RUTH E. GOLIAS
4 ' 2826 PACIFIC COAST HIGHWAY
5 '   TORRANCE, CALIF. 90505
6 '           1986
7 '*****************************
8 '
10 CLS6:FORB=1504 TO 1535:POKE B
,(143):NEXT 'GRASS-GREEN
20 FOR B=463 TO 465:PRINT@B,CHR$
(191);:NEXT 'DOOR-RED
30 FORB=431 TO 433:PRINT@B,CHR$(
191);:NEXT 'DOOR-RED
40 FORB=399 TO 401:PRINT@B,CHR$(
191);:NEXT 'DOOR-RED
50 PRINT@433,CHR$(190); 'DOOR KN
OB
60 PRINT@494,CHR$(140); 'WALK
70 FOR B=495 TO 497:PRINT@B,CHR$
(128);:NEXT 'WALK
80 PRINT@498,CHR$(140); 'WALK
90 FORB=453 TO 462:PRINT@B,CHR$(
159);:NEXT 'HOUSE-YELLOW
100 FORB=466 TO 475:PRINT@B,CHR$
(159);:NEXT 'HOUSE-YELLOW
110 FOR B=421 TO 430:PRINT@B,CHR
$(159);:NEXT 'HOUSE-YELLOW
120 FORB=434 TO 443:PRINT@B,CHR$
(159);:NEXT 'HOUSE-YELLOW
130 FORB=389 TO 398:PRINT@B,CHR$
(159);:NEXT 'HOUSE-YELLOW
140 FOR B=402 TO 411:PRINT@B,CHR
$(159);:NEXT 'HOUSE-YELLOW
150 FOR B=356 TO 364:PRINT@B,CHR
$(182);:NEXT 'LEFT ROOF-RED&BLAC
K
160 FORB=325 TO 333:PRINT@B,CHR$
(182);:NEXT 'LEFT ROOF-RED&BLACK
170 FORB=294 TO 302:PRINT@B,CHR$
(182);:NEXT 'LEFT ROOF-RED&BLACK
180 FORB=372 TO 380:PRINT@B,CHR$
(185);:NEXT 'RIGHT ROOF-RED&BLAC
K
190 FORB=339 TO 347:PRINT@B,CHR$
(185);:NEXT 'RIGHT ROOF-RED&BLAC
K
200 FORB=306 TO 314:PRINT@B,CHR$
(185);:NEXT 'RIGHT ROOF-RED&BLAC
K
210 FORB=365 TO 371:PRINT@B,CHR$
(159);:NEXT 'GABLE-YELLOW
220 FORB=334 TO 338:PRINT@B,CHR$
(159);:NEXT 'GABLE-YELLOW
230 FORB=303 TO 305:PRINT@B,CHR$
```

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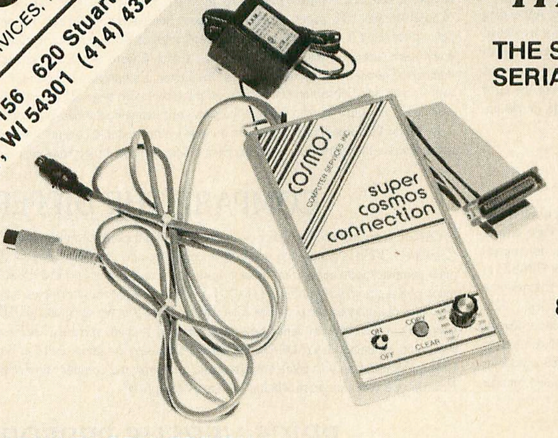

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32K SUPER COS-CON	**OTHER INTERFACE**
36.8 Seconds	4 min. 59.8 sec.

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"The CBASIC Compiler"

Now anyone can create fast efficient Machine Language Programs Easily and Quickly without having to use an Editor/Assembler

CBASIC is a fully integrated, easy to use Basic program Editor and Compiler package. CBASIC is 99% syntax compatible with Disk Extended Color Basic programs, so most Basic programs can be loaded and compiled by CBASIC with little or no changes required. The compiler is an optomizing two-pass integer Basic compiler that can convert programs written in Disk Extended Color Basic into 100% pure 6809 Machine Language programs which are written directly to disk in a LOADM compatible format.

The programs generated by the compiler can be run as complete stand alone programs. A built-in linker/editor will automatically select one and only one copy of each subroutine that is required from the internal run-time library and insert them directly in the program. This eliminates the need for cumbersome, often wasteful separate "run-time" packages.

CBASIC WAS DESIGNED FOR BOTH BEGINNING & ADVANCED USERS

CBASIC is a Powerful tool for the Beginner or Novice programmer as well as the Advanced Basic or Machine Language programmer. The Beginner or Novice programmer can write and compile programs without having to worry about Stack Pointers, DP registers, memory allocation, and so on, because CBASIC will handle it for you automatically. All they have to do is write their programs using the standard Basic statements and syntax. For the advanced Basic and Machine Language programmers, CBASIC will let you take command and control every aspect of your program, even generating machine code directly in a program for specialized routines or functions.

CBASIC adds many features not found in Color Basic, like Interrupt, Reset, and On Error handling. It also has advanced programming features that allow machine level control of the Stack and Direct Page registers, variable allocation, automatic 64K RAM control, program origin and even multiple origins. It can even have machine language code generated within a program that executes just like any other Basic program line.

FULL COMMAND SUPPORT & SPEED

CBASIC features well over 100 Basic Commands and Functions that fully support Disk, Tape, Printer and Screen I/O. It also supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Extended Color Basic, and all with 99.9% syntax compatibility.

CBASIC is FAST. Not only will CBASIC compiled programs execute 10 to 1000 times faster than Basic, but the time it takes to develop a CBASIC program versus writing a machine language program is much, much shorter. A machine language program that might take several months to write and debug could be created using CBASIC in a matter of days or hours, even for a well experienced machine language programmer. We had a report from a CBASIC user that claimed "a Basic program that used to take 3 hours to run, now runs in 7 to 8 minutes". Another user reported a program that took 1 to 1½ hours to run in Basic, now runs in 5 to 6 minutes!!!

MORE THAN JUST A COMPILER

CBASIC has its own completely integrated Basic Program Editor. The Editor contained in CBASIC is used to Create and/or Edit programs for the compiler. It is a full featured editor with functions designed specifically for writing and editing Basic programs. It has built-in block Move and Copy functions with automatic program renumbering. Complete, easy to use inserting, deleting, extending and overtyping of existing program lines. It is also used for Loading, Saving, Appending (merging), Killing disk files and displaying a Disk Directory. It also has automatic line number generation for use when creating programs or inserting sequencial lines between existing lines. You can set the printer baud rate and direct normal or compiled listings to the printer for hard copy. The built-in editor makes program corrections and changes as easy as "falling off a log". If CBASIC finds an error when compiling, it points to the place in the program line where the error occurred. All you have to do is tell the editor what line you want to start editing and when it is displayed, move the cursor with the arrow keys to the place where the error is and correct it. Just like that, it's simple.

HI-RES & 80 COLUMN DISPLAYS

CBASIC is the only Color Basic Compiler that includes its own Hi-Resolution 51, 64 or 85 by 24 line display. It is also the only compiler that supports both the PBJ "Word-Pak" and the Double Density 80 column cards. All of these display formats are part of the standard CBASIC compiler package. Not only can these display formats be used for normal program editing and compiling, but CBASIC will also include them in your compiled programs! If you want CBASIC to include the display driver in your program, all you have to do is use a single CBASIC command "HIRES". The run-time display driver that CBASIC includes in your program is not just a simple display, but a full-featured display package. With the Hi-Resolution display package you can mix text & graphics, change characters per line, underline, character highlight, erase to end of line or screen, home cursor, home & clear screen, protect screen lines, and much more. All commands are compatible with our HI-RES II Screen Commander so you can easily develop screen layouts using HI-RES and Color Basic before you compile your program. The same applies to using the 80 column card drivers. What other Basic compiler offers you this kind of flexibility?

64K RAM SUPPORT

CBASIC makes full use of the power and flexibility of the 6883 SAM (Synchronous Address Multiplexer) in the Color Computer. It will fully utilize the 96K of address space available in the Color Computer (64K installed) during program Creation, Editing and Compilation. CBASIC has a special command for automatic 64K RAM control. When used in a program, it allows the user to use the upper 32K of RAM space automatically for variables or even program storage at run-time. It will automatically switch the ROMs in and out when needed. There are also two other commands that allow you to control the upper 32K of RAM manually, under program control. No other Color Basic compiler directly supports the use of 64K RAM like CBASIC.

ALL MACHINE LANGUAGE

CBASIC is completely written in fast efficient Machine Language, not Basic, like some other Color Basic compilers. Because of this, CBASIC can edit and compile very large programs. Even using the Hi-Resolution 51 by 24 line display, it can work with about a 34K program, and the 80 column card versions can handle almost 40K of program. Some of the other Basic compilers can only work with 16K or about 200 lines. Even working with large programs, CBASIC compiles programs with lightning fast speed. It will compile a 24K program to disk in less than 2 minutes! That's without a listing being generated. We've heard stories about some other compilers that take almost 10 minutes to compile a simple 2-3K program. You might inquire about this when you look at some of the other compilers available.

THE FINISHED PRODUCT

Since CBASIC contains statements to support ALL of the I/O devices (Disk, Tape, Screen & Printer), Hi-Res Graphics, Sound, and Enhanced Screen displays, it is well suited for a wide range of programming applications. It generates a complete, Ready to Run machine language program. The finished product or program does not have to be interfaced to a Basic program to perform some of its functions or commands. This may seem obvious to you, but some of the other Color Basic compilers don't necessarily work this way. Some of their compiler commands need a separate Basic program in order for them to work. In some cases, require that a separate Basic program be interfaced to the compiled program to perform I/O functions, like INPUT, PRINT and so on. CBASIC doesn't do this. ALL of its commands are compiled into a single machine language program that does not require any kind of Basic program to make it work.

COMPATIBILITY

You may be wondering about those statements we made earlier concerning 99% or 99.9% syntax compatibility. What does that other 1% consist of? The biggest part of that 1% has to do with string arrays and variables. CBASIC does not use a "String Pool" like Color Basic. It uses absolute memory addresses to locate string variables and arrays. This is why CBASIC's string processing is so fast, it also eliminates the time consuming "Garbage Collection" problem. When CBASIC allocates space for strings, it must know how much space to use for each string. When you Dimension a string variable in CBASIC, you must tell it how much space you want to save for each element. To Dimension an array of 40 strings, 64 characters each, you would DIM DA$(40,64). If a string is not dimensioned, CBASIC will automatically allocate 32 bytes for it. If you want a single string to have enough room for 200 characters you would DIM AX$(200). For string arrays, you would still access the element you want, the same as Color Basic, to get string #30 from the array DA$, you would still use DA$(30), the only real change is in the DIM statement. For undeclared string arrays of 10 elements or less, CBASIC will automatically reserve space for 10 (0-9) strings of 32 characters. In some other Color Basic compilers, you have to declare EVERY string variable used in the progrm in a DIM statement. And, to create an array of 40 strings with 64 characters each, you would have to DIM AD$(2560), and then to access string #30, you would have to multiply 30 × 64 and use a special variable name format or access it one character at a time. Not very compatible or convenient to use, and difficult at best.

CBASIC REQUIREMENTS

CBASIC requires a minimum of 32K RAM and at least one Disk drive. We strongly recommend that you have 64K. CBASIC is compatible with all versions of Color & Extended Basic and both Disk Basic V1.0 and V1.1. Programs compiled on either system will run on systems with different ROMs. CBASIC is NOT compatible with JDOS.

DOCUMENTATION

The Documentation provided with any program is very important to the user. This is especially true when you talk about a program as complete and complex as CBASIC. Even though CBASIC was designed to be the most User Friendly compiler on the market, we went to great lengths to provide a manual that is not only easy to use and understand, but comprehensive and complete enough for even the most sophisticated user. The manual included with CBASIC consists of approximately 120 pages of real information, not like some manuals that put just one or two short paragraphs on a page. If we did it that way, we could have easily created a three or four hundred page manual. The manual index breaks down each section of the manual and gives a 3 or 4 word description of each section and its items along with page numbers. The manual has three sections, the Editor, Compiler and Appendix. Each of these is divided into subsections, with Section and Subsection titles printed at the top of each page. If you want to, you could find the information you are looking for by simply flipping through the pages and scanning the Section titles on the top of the pages. The Manual itself is an 8½ by 11 Spiral Bound book with durable leather textured covers. Some of the reports we have had from CBASIC users describe the manual as being the Best program manual they have ever used.

COMPARE THE DIFFERENCE

CBASIC is not just another Color Basic Compiler. It is the only complete Basic Compiler System for the Color Computer. Compare CBASIC's features to what other compilers offer and you'll see the difference. When comparing CBASIC to other compilers, you might want to keep some of these questions in mind. Does it support I/O functions? You can't write much of a program without PRINT, INPUT and so on. What about complex string statements, or string statements at all? How large of a program can you write? Can you compile a complex string like: MID$(RIGHT$(DA$(VAL(IN$),LEN(LE$)),3,3)? Can you use two character variable names for string & numeric variables, like Basic. Does it support all the Hi-Res graphics statements including PLAY, DRAW, GET and PUT, using the same syntax as Basic? Do you ever have to use a separate Basic program? Can you take complete Basic programs and compile them without extensive changes? Will they work? How do you edit a program when it has errors compiling?

PRICE VERSUS PERFORMANCE

The price of CBASIC is $149.00. It is the most expensive Color Basic Compiler on the market, and well worth the investment. We spent over 2 years writing and refining CBASIC, to make it the Best, most Compatible Color Basic compiler available. Most of our CBASIC users already bought one or more of the other compilers on the market and have since discarded them. We even traded in a few of them. If you want a cheap compiler, we'll sell you one of those traded in, at a good price. Before you buy a compiler, compare the performance of CBASIC against any Color Basic compiler. Dollar for Dollar, CBASIC gives you more than any other Color Basic compiler available.

ORDERING INFORMATION

To order CBASIC by mail, send check or money order in the amount of $149.00 plus $3.00 for shipping and handling to the address listed below.

To order by VISA, MASTERCARD or COD, call us at: (702) 452-0632 (Monday thru Saturday, 8am to 5pm PST).

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BUFFER
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- Programmable Control Character Trapping
- Programmable Open/Close Buffer Characters
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"The Source"

has arrived!

The Source brings the cost of Disassembler and Assembler Source code generation down to Earth.

Now you can Disassemble Color Computer machine language programs and generate beautiful, Assembler Source Code for a fraction of the cost of other Disassembler/Source Generator programs.

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Graphics Adventure Game

Six months ago a terrorist group demanded to be designated the rulers of Alpha Sigma III, under the threat of world starvation on the planet Earth. The Federation denied their demands, so they released a biological weapon which has destroyed all known edible plant species from throughout the known galaxy. To date no plant life has been able to survive on Earth. Recently, Federation undercover agents have reported a story told by a roving space trader, of a planet with abundant edible plant life. These plants have a reputation of being able to survive in all climates and in fact, are supposed to grow at an incredible rate. The Federation is desperate! If Earth's food source is not replaced soon, the Federation will have to evacuate all animal and Human life. Your mission is to go to the planet Zephyr and obtain the seed of these plants and return to Earth. Several Federation agents have been sent to obtain the seeds and none has returned! Can you get the seed and survive??? GOOD LUCK!

32K Disk $21.95

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NEW IMPROVED VERSION

- ***UP TO 85 CHARACTERS PER LINE READABILITY***
- ***ADJUSTABLE AUTOMATIC KEY REPEAT***
- ***PROPTECT 1-23 SCREEN LINES***
- ***CONTROL CODE KEYBOARD***

- FULLY BASIC COMPATIBLE
- DISPLAY FORMATS OF 28 to 255 CHARACTERS PER LINE
- FULL 96 UPPER/LOWER CASE CHARACTERS
- MIXED GRAPHICS & TEXT OR SEPARATE GRAPHIC & TEXT SCREENS
- INDIVIDUAL CHARACTER HIGHLIGHTING
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- WRITTEN IN FAST MACHINE LANGUAGE
- AUTOMATIC RELOCATES TO TOP OF 16/32K
- AUTOMATICALLY SUPPORTS 64K of RAM WITH RESET CONTROL
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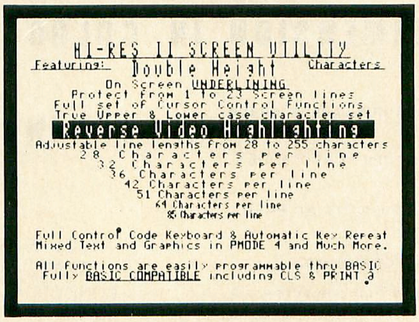
- ERASE TO END OF LINE
- ERASE TO END OF SCREEN
- HOME CURSOR
- BELL TONE CHARACTER
- HOME CURSOR & CLEAR SCREEN
- REQUIRES ONLY 2K OF RAM
- COMPATIBLE WITH ALL TAPE & DISK SYSTEMS



```
           HI-RES II SCREEN UTILITY
Featuring:      Double Height      Characters
             On Screen UNDERLINING
         Protect from 1 to 23 Screen lines
       Full set of Cursor Control Functions
       True Upper & Lower case character set
          Reverse Video Highlighting
Adjustable line lengths from 28 to 255 characters
       28  Characters  per  line
        32  Characters  per  line
         36  Characters  per  line
          42 Characters per line
           51 Characters per line
            64 Characters per line
             85 Characters per line

Full Control Code Keyboard & Automatic Key Repeat
Mixed Text and Graphics in PMODE 4 and Much More.

All Functions are easily programmable thru BASIC
 Fully BASIC COMPATIBLE including CLS & PRINT @
```

$24⁹⁵ TAPE **$29⁹⁵** DISK

ALL ORDERS SHIPPED FROM STOCK
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Screen Enhancement Program Comparison Chart

PROGRAM FEATURES	HI-RES II NEW	HI-RES I OLD	BRAND X
Upper/Lower case characters	Yes	Yes	Yes
Mixed Text and Graphics	Yes	Yes	Yes
Separate Text & Graphics	Yes	Yes	No
Print @ fully implemented	Yes	Yes	Yes
Print @ on all line lengths	Yes	Yes	51 only
Different line lengths	28 to 255 (9)	28 to 255 (9)	51 only (1)
Automatic Key Repeat	Yes	Yes	Yes
Adjustable Key Repeat	Yes	No	No
Auto Repeat Disable	Yes	No	No
Erase to end of line/screen	Yes	Yes	Yes
Home Cursor	Yes	Yes	Yes
Solid or Blinking Cursor	Yes	No	Yes
CLS command supported	Buff/Black	Buff/Black	Buff/Black
X,Y Coordinate Cursor Positioning	Yes	Yes	No
Double Size Characters	Yes	Yes	No
Individual/Continuous Highlighting	Yes	Yes	No
On Screen Underlining	Yes	Yes	No
Clear Key functional	Clear/L keys	Clear key	No
16,32 & 64K Supported	Yes	Yes	Yes
Green or Black Background Color	Yes	No	No
Dual Character sets for Enhanced 64 and 85 Characters per line display	Yes	No	No
Protected Screen Lines (programmable)	1 to 23	No	No
Full Control Code Keyboard for Screen control directly from the keyboard	Yes	No	No
Programmable Tab Character Spacing	Yes	No	No
Full Screen Reverse Function	Yes	Yes	No
Switch to & from the Standard 16 by 32 Screen for full compatability	Yes	No	No
On Error Goto Function	No	No	Yes
Extended Basic Required	No	Yes	Yes
All Machine Language Program	Yes	Yes	Yes
RAM Required in addition to Screen RAM	2K	2K	2K
Program Price (Tape)	$24.95	$19.95	$29.95

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```
(159);:NEXT 'GABLE-YELLOW
240 PRINT@336,CHR$(163); 'GABLE
WINDOW
250 FORB=263 TO 271:PRINT@B,CHR$
(182);:NEXT 'LEFT TOP ROOF-RED&B
LACK
260 PRINT@272,CHR$(147); 'CENTER
 ROOF
270 FOR B=273 TO 281:PRINT@B,CHR
$(185);:NEXT 'RIGHT TOP ROOF-RED
 AND BLACK
280 FORB=233 TO 235:PRINT@B,CHR$
(191);:NEXT 'CHIMNEY
290 FORB=424 TO 427:PRINT@B,CHR$
(211);:NEXT 'LEFT WINDOW
300 FOR B=437 TO 440:PRINT@B,CHR
$(211);:NEXT 'RIGHT WINDOW
310 FOR B=476 TO 479:PRINT@B,CHR
$(149);:NEXT 'RIGHT FENCE
320 FOR B=444 TO 447:PRINT@B,CHR
$(149);:NEXT 'RIGHT FENCE
330 FOR B=412 TO 415:PRINT@B,CHR
$(221);:NEXT 'TOP RIGHT FENCE
340 FOR B=448 TO 452:PRINT@B,CHR
$(154);:NEXT 'LEFT FENCE
350 FORB=416 TO 420:PRINT@B,CHR$
(154);:NEXT 'LEFT FENCE
360 FOR B=384 TO 388:PRINT@B,CHR
$(222);:NEXT 'TOP LEFT FENCE
370 FOR B=89 TO 91:PRINT@B,CHR$(
159);:NEXT 'SUN
380 FORB=121 TO 123:PRINT@B,CHR$
(159);:NEXT 'SUN
390 PRINT@202,CHR$(207); 'SMOKE
400 PRINT@169,CHR$(207); 'SMOKE
410 PRINT@136,CHR$(207); 'SMOKE
420 PRINT@105,CHR$(207); 'SMOKE
430 PRINT@74,CHR$(207); 'SMOKE
440 PRINT@41,CHR$(207); 'SMOKE
450 FOR D=1 TO 800:NEXT
460 FOR B=0 TO 31STEP4:PRINT@B,C
HR$(191)+CHR$(175)+CHR$(159)CHR$
(191);:NEXT B  'TOP BORDER
470 FOR D=1 TO 2000:NEXT D
471 ' WALKING LETTERS
480 PRINT@0,STRING$(32," ");
490 A$="    --  HOME SWEET HOME
--  "
500 S=150
510 B=0:PRINT@B,A$;
520 FOR X=1 TO S:NEXT X
530 B=B+1
540 IF B=32 THEN 510
550 PRINT@B,LEFT$(A$,32-B);
560 PRINT@0,RIGHT$(A$,B-0);
570 GOTO520
```

MUL-T-SCREEN

RAINBOW CERTIFICATION SEAL

COLOR CHARACTER GENERATOR

A NEW DIMENSION IN COLOR COMPUTING

RAINBOW CERTIFICATION SEAL

- Now includes a character generator and sample graphic space game at no extra cost.
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- Special Trace Delay can be used to debug programs one line at a time (even graphics).
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- A must for all color computer owners. Once you try it you won't write another program without it.

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COLORCHESTRA

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With COLORCHESTRA, you can create masterpieces of music, overlaying up to 8 tracks of synthesizer sound.

Once you've keyed or played your composition into the Color Computer, you can edit each individual note; and, after you're satisfied with what you've got, there's quantizing to clean up timing errors.

COLORCHESTRA works with you to record music in real time and adds the features of mixing or transposing tracks; and, with 8,000 note storage capability, you have enough power to produce the most demanding music compositions.

The COLORCHESTRA software (from the author of CoCo MIDI), is simple to use incorporating menus and graphic icons and can be cassette driven or called up on disk with your 64k Color Computer.

As for the hardware, it was carefully designed to be something special. Each cartridge is fabricated in genuine walnut and hand finished. The boards are 7 mil gold plated, (not just the edge connector--the ENTIRE board) for optimum interface connection. Because each piece resembles a fine musical instrument, it is serially numbered on the case for your collection.

Although COLORCHESTRA incorporates outstanding professional features found in other MIDI systems, it's priced just right.
At $149.95, you can MIDI-ize your 64kCoCo.

The complete package includes hardware, sequencing software, ring bound quality documentation and two MIDI cables.

So now all of those fantastic music sounds you've been hearing in your head can be produced for the whole world to hear.

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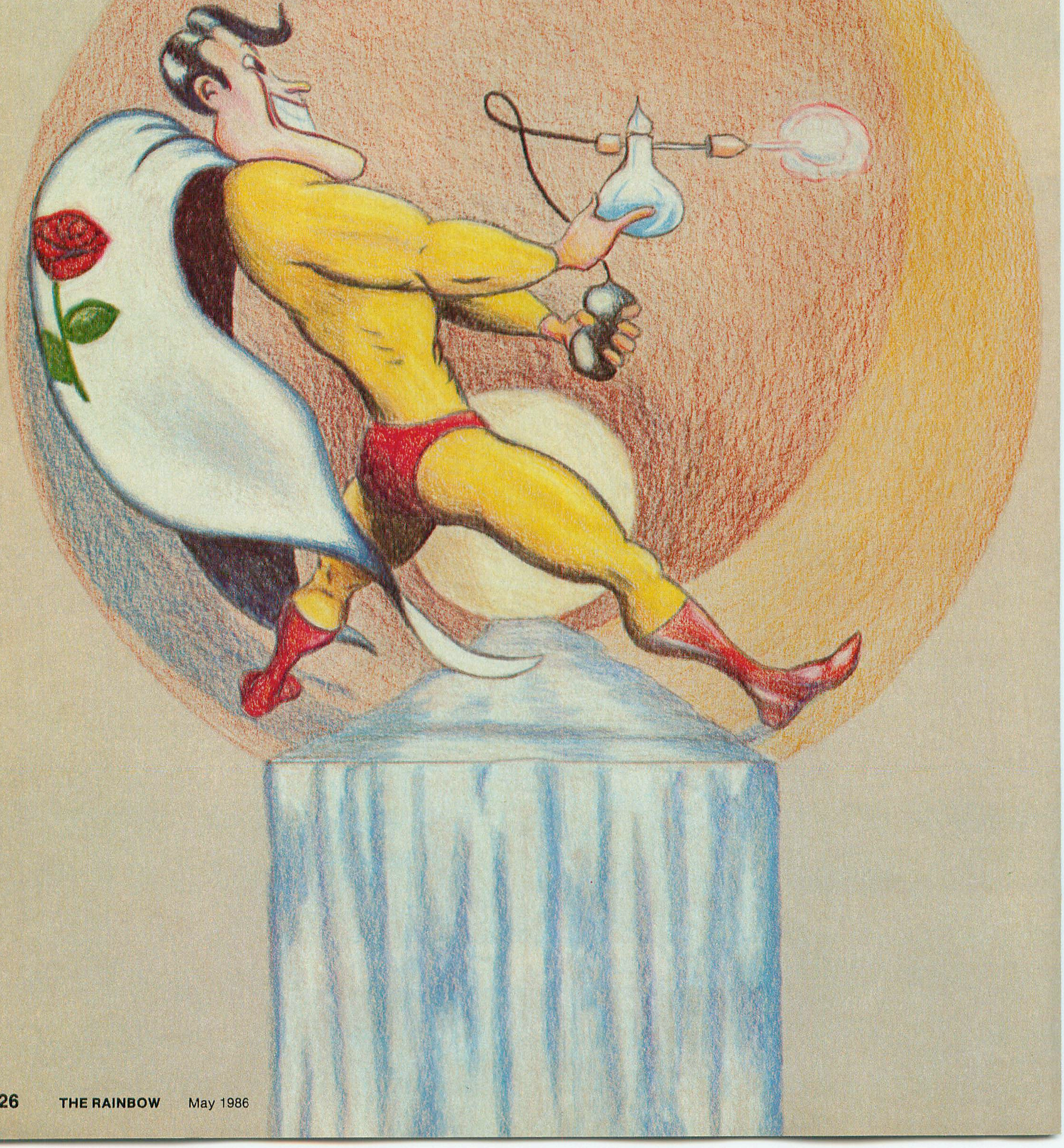

It's a dirty job, but somebody's gotta do it!

Get Down and Dirty in New York's Sewers with Super Rooter

By Mark Nelson

Once a year, a major cleaning is necessary in the New York City sewers. This year a special sewer cleaning device called the Super Rooter has been designed and built to make cleaning the sewers faster and more economical. However, there are some critics of the project on the city council. The Rooter is very expensive to operate, so if a strict time schedule is not met, the city will be out several thousand dollars. Your job as pilot of the Rooter is to clean the sewer within the time limit set by the city council.

Once inside the sewer, you notice white globs of waste that have formed and are hanging from the ceiling. You drive the Rooter over them and hear the "gulp" as the waste is literally sucked into the Rooter and out of the sewer. Some of the waste has fallen from the ceiling, however, and is floating around the sewer. Be careful not to let this floating waste run into the side of the Rooter or it will be damaged. It must also be sucked up by running over it. Once all the hanging globs are cleaned off the ceiling, a trap door is opened to allow travel deeper into the sewer to meet increasingly difficult janitorial duties.

Use the right joystick to move the Rooter through the sewer

Mark Nelson is a computer science student at Brigham Young University and author of the Second RAINBOW Adventure Contest winner, Head of the Beast.

drain pipes. To back up, press and hold the red firebutton.

You receive 10 points each for sucking up hanging globs of waste and additional bonus points for completing each drain. Extra time (one to five seconds) is awarded for sucking up floating waste.

Super Rooter is a machine language program "hidden" in BASIC `DATA` statements. The two listings, *Part1* and *Part2*, create the machine language program in memory. The listings are very long and tedious to type in, so you may want to fill out the order form for RAINBOW ON TAPE right now. If you choose to type the listings in, be very careful and save them before running. Do not run either listing before saving both. `CLOAD` and run *Part1*. After it has finished, you may `CLOAD` and run *Part2*. Once you have done this, save the machine language program to either tape or disk. It is a simple procedure and may be accomplished in the following manner. On a cassette based system, type: `CSAVEM"RTR",&H5A51,&H75FE,&H6000`. On a disk-based system, type: `SAVEM"RTR",&H5A51,&H75FE,&H6000`.

After the ML routine has been saved, turn your CoCo off, wait for 15 seconds and turn it back on. Now `LOADM` or `CLOADM "RTR"` and type `EXEC`.

I'll be watching RAINBOW "Scoreboard" to see who's really cleaning up! Good Luck! ☐

Listing 1: `PART1`

```
1 ' (C) 1985 BY MARK NELSON
            super-rooter"
10 DATA1F509E498C0000244C318B300
29F49ECA439864F3402BDA390A6E0260
2250530015A20217EAE09352 0E1E4230
2E6E43542342096AE27147EB2778DC4E
6A43A301F9F493021E1C0220FE7C05C5
A27C2A680A7C020F7C606CEC61A7EAC4
635208D7BEB6325F3A663E76317009D1
F893384AE648D7FEF648DD3
20 DATA8D6F8DCF35146EA44C4C4C344
08D3C9606260 8BDBC148D6FEDF139E68
4AE02354020AA4C4C4C34408D2196062
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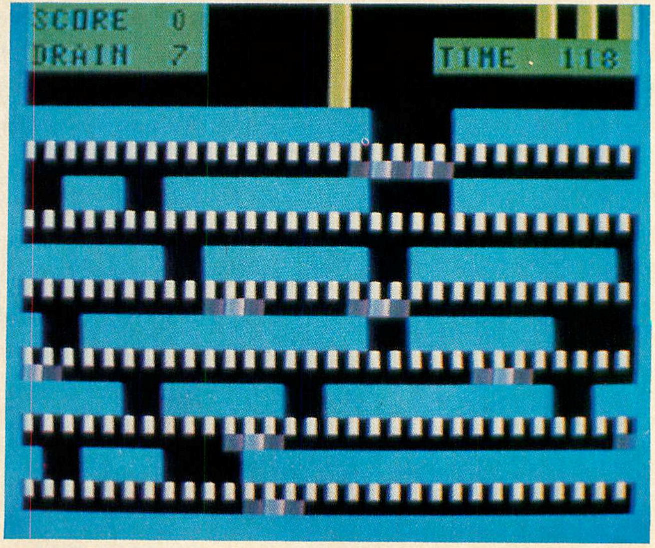

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New!

Adventure In Mythology
By Scott Cabit

An animated graphics adventure. Battle monsters and discover treasures as you assume the personalities of various heroes in ancient Greek mythology! You goal is to win the hand of the beautiful Atalanta, the swift-running huntress. But beware of the perils and obstacles that stand in your way as you journey through ancient Greece! Four-voice music and sound effects, automatic speech when using a Tandy SSC speech pak. Load and Save feature, over 250 locations. 64K Machine language.

Tape $21.95 Disk $24.95

Fighter Pilot

An original arcade game! Wave after wave of attacking aircraft attempt to shoot you down as you maneuver your fighter into the wild blue yonder, blasting enemy fighter, bombers, and paratroopers out of the sky. Joystick or keyboard operation, "pause game" feature. Disk version saves high scores. 32K, 100% Machine Language. See February '86 Rainbow for review.

Tape $21.95 Disk $24.95

Disk Utility Package

12 great disk utilities in one package! Includes Archive, Backup (35 or 40 track), Format (35 or 40 track...fast!), Find (searches file for a pattern, reports all occurances), Compare (compares two disk files), Occount, and Menu (reads all disks in the system and displays a sorted directory from which to choose). 32K, one disk drive required. See February '86 Rainbow for review.

Disk $19.95

CGP-220 Screen Dump

A graphics screen dump utility for the CGP-220 Ink Jet Printer. Features include: Fast machine language, four-color and one-color versions, special CoCo Max version, user-selectable colors, regular or double-size printout. 16K.

Tape $14.95 Disk $17.95

New!

Andrea Co Co

The Andrea CoCo
By Art Martin

Another great animated graphics adventure! All you came down to the Yacht Club for was to get a drink and maybe play a little poker. Heck, nobody would ever guess that the closest thing you owned to a real yacht was the one over your fireplace. It was in the bar that you heard rumors of earth-shattering events about to take place. You step out onto the wharf to get a little air when your natural curiosity and sense of adventure start to work...Can you save the world? Superb graphics, save & load feature. 64K, one disk drive required.

Disk $24.95

Pumpman

You'll dig this 100% ML arcade game! The Pumpman carries a pump that he fires at aliens Pooky and Dragon as they change forms and chase him around underground. 15 different screens, "pause game" feature, bonuses. As fun and challenging as the original arcade game! 32K, one joystick required.

Tape $21.95 Disk $24.95

Label Maker 3.0

A utility for printing labels, compatible with all types of printers. Features include Hi-Res screen preview before printing, automatic centering, up to nine lines of copy, changeable baud rates, variable font selection. All defaults can be customized. 32K Extended, supplied on tape. Disk transferable.

Tape $19.95

The Best Epson Screen Dump

An easy-to-use screen dump utility for Epson, Panasonic, Gemini, and compatible printers. Three sizes of printouts, double-strike option, reverse printing switch, use of double-density, bit-image mode, allows you to view the graphics screen before printing. 16K, supplied on tape. Disk transferable.

Tape $14.95

Coming Soon...Otto's Oddysey!
64K Graphics Adventure
By Steve Hartford

More Great Software!!!

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Blackjack Dealer With Feeler Dealer, 32K	$21.95*
Alpha 40+ Formats 40+ Tracks, 32K Disk	$19.95
Maycode 6809 Disassembler, 32K	$21.95*
Menu Maker ML Utility, 32K Disk	$19.95
Hires+ Screen Enhancer, 16K Tape	$19.95
64K Print Spooler 64K Tape	$9.95

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000117F4FCE3E1ED8DEAABCC
610 CLEAR 400,&H5A50
615 PRINT "   RELAX - THIS TAKES
 A MINUTE"
620 FOR X= 1 TO  30
630 READ A$
640 FOR Z= 1 TO 240 STEP 2:Z$=MI
D$(A$,Z,2):POKE &H5A51+C,VAL("&H
"+Z$):C=C+1:NEXT Z,X
650 PRINT" NOW LOAD AND RUN PART
2"
660 ' (C) 1985 BY MARK NELSON
              super-rooter"
```

Listing 2: PART2

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10 ' (C) 1985 BY MARK NELSON
              super-rooter"
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00FF00FF00FF00FF00FF00FF00FF00FF
00FF00FF00FF00FF00FF00FF00FF00FF
00FF00FF00FF00FF00FF00FF
610 CLEAR 400,&H5A50
612 PRINT"   THIS TAKES ANOTHER
MINUTE"
615 C=3600
620 FOR X= 1 TO  30
630 READ A$
640 FOR Z= 1 TO 240 STEP 2:Z$=MI
D$(A$,Z,2):POKE &H5A51+C,VAL("&H
"+Z$):C=C+1:NEXT Z,X
645 PRINT"AFTER YOU SAVE THE PRO
GRAM TO   TAPE OR DISK, TURN THE
 COMPUTER OFF AND THEN BACK ON A
ND cLOADM RTR, THEN EXEC.":PRINT
650 PRINT"NOW SAVE THE FILE TO T
APE:":PRINT "CSAVEM'RTR',&H5A51,
&H75FE,&H6000":PRINT"OR TO DISK:
":PRINT"SAVEM'RTR',&H5A51,&H75FE
,&H6000"
660 ' (C) 1985 BY MARK NELSON
           super-rooter"
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64k CoCo II Upgrade $20

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'KEEP-TRAK' Accounts Receivable. (Avail. 10/01/85).

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'COCO WINDOWS' Available 10/31/85

With hi-res character display and window generator. Features an enhanced key board (klicks) and 10 programmable function keys. Allows the user to create multiple windows from basic. Includes menu driven printer setup and auto line numbering. Four function calculator. with memory. The above options can be called anytime while running or writing in BASIC. APPLE PULL YOUR DRAPES, YOU DON'T WANT TO SEE THIS. **$19.95** (disk or tape) includes manual.

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The new Epson LX-80 offers printing flexibility in two modes: one mode allows you to print in a quick (100 cps) dot-matrix style for programming and graphics, and the Near Letter Quality mode (16 cps) produces precise (240 dots per inch), beautiful type for correspondence, reports, and similar purposes. The LX-80 offers 160 different type-style combinations, including Pica, Elite, Enlarged, Emphasized, Condensed, Subscripts and Superscripts, and type-styles can be selected quickly from the top control panel or from program control. Comes standard in friction feed; tractor option is also available.

LX-P package includes an LX-80, a serial interface, a Color Computer to Epson cable, and Printer Tutorial that teaches you how to program the different type styles ($29.95 value).

LX-P: LX-80 package $317 ($7 shpg)

ET-1 tractor option for LX-80. $29.50.

SF-1 Single-sheet feeder for the LX-80. $145 ($7 shpg)

Epson	RX-80 FT	repack	$207.
Epson	LX-80 New		$249.
Botek	Serial to parallel converter		$68.45
Howard	CoCo to Epson cable		$25.

MONITORS

123 Zenith 12" Green Screen, 640 dots x 200 dots resolution, 15 MHz band width. **$114** ($7 shpg)

123A Zenith 12" Green Screen Special, $67.50 ($7 shpg) 80 Column non glare

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All monitors require video controller.
Reverse video free with monitor order.

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64-E1 for E Boards with complete instructions. Remove old chips and replace with preassembled package—no soldering or trace cuts. **$28.45** ($2 shpg)

64-F1 for F Boards. No soldering needed. Capacitor leads must be cut. **$24.45** ($2 shpg)

64-2 for COCO 2. Kit requires one solder point, no trace cuts. **$24.45** ($2 shpg)

CONTROLLERS

New Controller from J&M: Has switch that allows either JDOS or RS DOS to be the disk operating system; eliminates software compatibility problems, while preserving the advantages of J&M's gold contacts and data separator. Also added to the DC-2 is a parallel port, which means a serial interface is no longer needed to make a parallel printer (like the Epson) work.

DC-2 Disk Controller with JDOS. **$128** ($2 shpg)

RS-1: RS DOS ROM Chip. $20.00 ($2 shpg)

DC-1 Disk Controller reads and writes to 35 and 40 track single and double-sided drives for *all* models of the Color Computer w/ JDOS. **$128** ($2 shpg)

VC-1 Video Interface mounts inside Color Computer by piggy-backing IC on top of interface—no soldering, no trace cuts. All models give composite video & sound. **$24.45** ($2 shpg)

VC-2 for COCO 2—mono only. **$26.45** ($2 shpg)

VC-3 for COCO 2—both color or monochrome **$39.45** ($2 shpg)

VC-4 for new Color Computer (no sockets, chips are soldered to mother board). Attaches with spring-loaded clips. Color or mono. **$39.45** ($2 shpg)

EPSON AND J&M

The EJ-P Package

The Epson LX-80 Printer teamed with our new J&M DC-2 Controller gives you top printing capabilities *plus* built-in switch gives JDOS or Radio Shack DOS so all software can run on your Color Computer. Package includes: Epson LX-80 Printer with ET-1 tractor; DC-2 controller; parallel Color Computers to J&M cable; Epson Printer Tutorial ($29.95 value).

Complete EJ-P package $425.00 ($7 shpg)

Epson Homewriter HM1 has serial pick interface and cable included. 100 CPS, bidirectional dot matrix impact for regular paper and one copy.

$258 ($7 shipping)

HOWARD QUALITY STANDS

New TS-1X Monitor Stand: Designer-beautiful stand with clear corner posts, easy side access to ROM port, reset and on/off buttons. **$39.50** ($3 shpg)

TS-1: Standard 13" monitor stand for the original Color Computer. Specify black, ivory or clear. 15"×11"×4". **$29.50** ($3 shpg)

TS-2: Same as above for the COCO 2. **$29.50** ($3 shpg)

PS-1X Printer Stand features new noise-suppressing foam top and cork base. 15"×11"×2½". **$24.95** ($3 shpg)

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Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out; test it for compatability. It you're not happy with it for any reason, return it in 30 days and we'll give you your money back—no questions asked.

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10:00-3:00 Sat.

System requirements: CoCo with 1 disk, 32K RAM, 80 columns printer
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free with	definable ledger numbers a $39/VALUE
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	WITH PAYROL/BAS YOU WILL ALSO WANT
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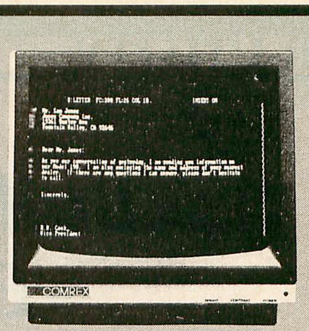

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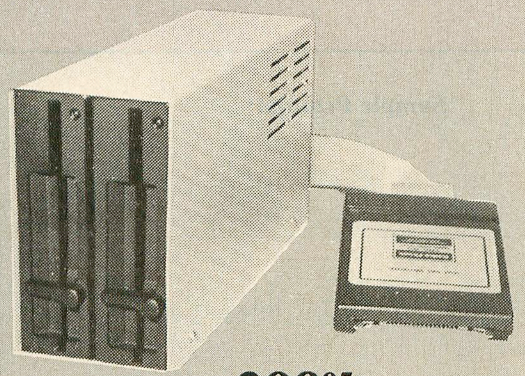

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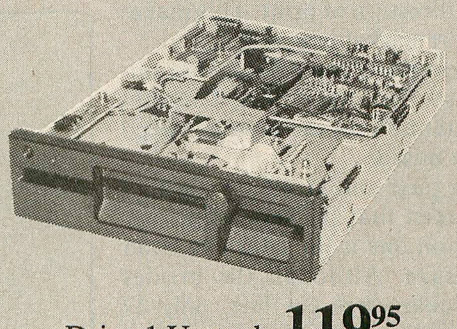

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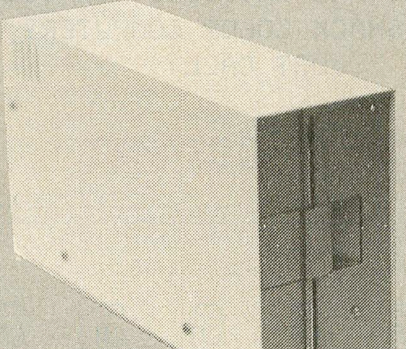

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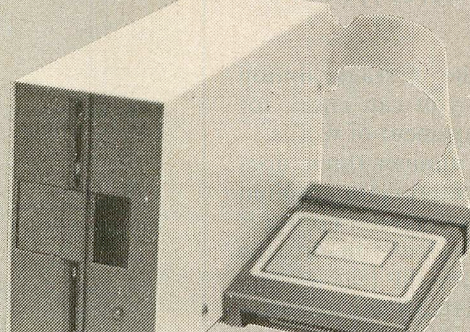

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Bulletin Board Standouts are Easy with Message Maker

By James R. Dean

Message Maker is a 16K BASIC program and requires the use of the CGP-115 printer.

Unlike other printers, the CGP-115 has a programmable control code that allows it to draw, change colors and rotate the direction of print. This makes it a pretty remarkable machine.

I used several of these options in this program so that the finished output attracts attention on the most crowded of bulletin boards.

The title page and menu are together on one screen that provides three options. Option one is the editor to enter your message. Although the printer writes 40 characters per line, only 32 character lines can be used because of the framing. To change the input from five lines to seven, change the '5' in lines 55, 100 and 200 to a '7' and add the following line:

```
197 PRINT#-2, CHR$(11);:PRINT
 #-2, CHR$(11);
```

After entering the message, option two displays it so you can check for mistakes or rearrangement of words.

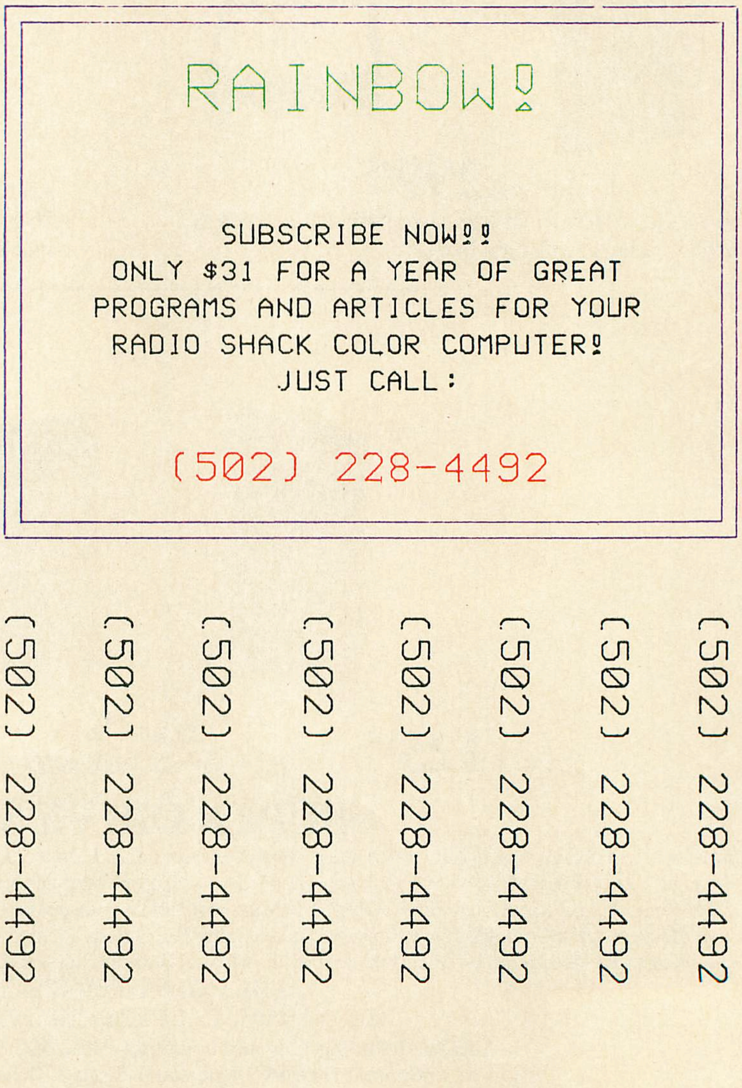
The last option, number three, does all the work. After entering the required number of copies (a maximum of six is used because the pens may run out), the program prompts for the tear-off section. This can be deleted if you just want to post a bulletin and do not need your telephone number listed.

Finally, separate the messages and, if you opt for the tear-offs, use a pair of scissors to make the cuts between the numbers.

If you have any questions regarding this program, I can be reached at R.R. #3, Stirling, Ontario K0K 3E0 and will be happy to help you if I can. ☐

James Dean has been programming for four years on his CoCo and has a degree in BASIC programming. His goal is to understand machine language some day. James lives in Stirling, Ontario.

Sample Printout:



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```

The listing: MESSAGE

```
10 CLS:PRINT@9,"MESSAGE MAKER"
15 PRINT@78,"by"TAB(42)"JAMES DE
AN"TAB(45)"'85"
20 PRINTTAB(4)"FOR THE CGP-115 P
RINTER":PRINTSTRING$(32,"-")
25 PRINT:PRINTTAB(9)"(1) - EDITO
R"TAB(41)"(2) - DISPLAY"TAB(41)"
(3) - PRINTER"
30 PRINT:PRINTTAB(9):INPUT"YOUR
CHOICE";A:SOUND100,2
35 IFA>3THEN10ELSE ON A GOTO40,8
5,130
40 CLS:PRINT@12,"EDITOR":PRINTST
RING$(32,"*")
45 LINEINPUT"ENTER YOUR HEADING(
14 CHAR.MAX) ";H$
50 IFLEN(H$)>14THEN40
55 FORX=1TO5
60 PRINT"LINE#";X:LINEINPUT A$(X
)
65 IFLEN(A$(X))>32THEN60ELSENEXT
70 CLS:INPUT"ENTER PHONE #";PN$
75 IFLEN(PN$)>26THEN70
80 GOTO10
85 CLS:PRINT@12,"DISPLAY":PRINTS
TRING$(32,"*")
90 S=(32-LEN(H$))/2
95 PRINTTAB(S);H$:PRINT
100 FORX=1TO5
105 D=(32-LEN(A$(X)))/2
110 PRINTTAB(D);A$(X):NEXTX
115 PRINT:P=(32-LEN(PN$))/2
120 PRINTTAB(P);PN$
125 I$=INKEY$:IFI$=""THEN125ELSE
10
130 CLS:PRINT@12,"PRINTER":PRINT
STRING$(32,"*")
135 PRINT:PRINT"HOW MANY COPIES
(1-6)";:INPUTC
140 IF C>6THEN130
145 PRINT:PRINT"DO YOU WANT THE
TEAR OFF SECTION";:INPUTL$
150 IF LEFT$(L$,1)="Y"THENP=1
155 FORT=1TOC
160 PRINT@325,"PRINTING ";T;" OU
T OF ";C:SOUND200,4
165 PRINT#-2,CHR$(18);"S4":PRINT
#-2,"Q0"
170 PRINT#-2,"C3"
175 PRINT#-2,CHR$(17)
180 PRINT#-2,STRING$((16-LEN(H$)
)/2,CHR$(32));H$
185 PRINT#-2,CHR$(18);"S1"
190 PRINT#-2,"C0"
195 PRINT#-2,CHR$(17)
200 FORX=1TO5
205 PRINT#-2,STRING$((40-LEN(A$(
X)))/2,CHR$(32));A$(X):NEXTX
210 PRINT#-2,CHR$(18);"C2":PRINT
#-2,"S2":PRINT#-2,CHR$(17)
215 PRINT#-2,STRING$((26-LEN(PN$
))/2,CHR$(32));PN$
220 PRINT#-2,CHR$(18);"C1"
225 PRINT#-2,"J0,350,480,0,0,-35
0,-480,0"
230 PRINT#-2,"M10,10"
235 PRINT#-2,"J0,330,460,0,0,-33
0,-460,0"
240 PRINT#-2,"M-5,-50":PRINT#-2,
"I":IF P<>1THEN275
245 PRINT#-2,"C0"
250 PRINT#-2,"M3,0":PRINT#-2,"Q1
"
255 FORQ=1TO8
260 PRINT#-2,"I":PRINT#-2,"P";PN
$
265 PRINT#-2,"H":PRINT#-2,"M65,0
":PRINT#-2,"I"
270 NEXTQ:PRINT#-2,"M-520,-340":
PRINT#-2,"I"
275 NEXTT
280 PRINT:PRINTTAB(6)"HIT ANY KE
Y FOR MENU"
285 I$=INKEY$:IFI$=""THEN285ELSE
GOTO10
```

At Last — **INTERCOMP SOUND** presents:
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Design your own crossword puzzles . . .

Acrostics Go High Tech with Word+

By Rolla Price

Making words on a crossword grid, saving the words and grid on tape, and loading words and grid for display are the objectives of *Word+*.

First, carefully type the program listing and save it on tape. Run the program watching the logo `WORD WORD` display vertically and horizontally to form a cross. That's correct, this program (with considerable aid from its user) makes a crossword puzzle! An excellent learning practice for *Word+* is to copy a crossword puzzle from a newspaper, magazine, etc.

With a crossword puzzle to follow (see Figure 1), press 'M' to make words. The crossword grid consists of rows and columns of boxes. Count the total number of rows and enter the correct amount to answer `ROWS. . . . .(1-15)?` Do the same for `COLUMNS . . .(1-15)?` The maximum size is 15 by 15. When finished, the screen displays a graphics of the grid.

It is in graphics mode and the control of input is with the cursor in the upper left corner. Press '?' for help. Move the cursor with the arrow keys and space bar. Tap the appropriate arrow key to move once, or hold down for continuous movement. The space bar moves the cursor one box to the right. Print the words in the boxes. If you need to paint a box black, use '+'. An incorrect input can be corrected using CLEAR to erase the box. Don't be alarmed when the cursor wraps around from right to left — this is an aid in the word making mode.

To number the boxes, move the cursor to the upper left corner and press '#'. The cursor flashes through the grid letter by letter. Pressing SHIFT-CLEAR clears the words. Pressing '&' changes the program mode back to 'M' (making) and pressing '#' reveals all the letters that have been entered. This is handy if an incomplete puzzle is saved.

Do you have the boxes numbered? It's now time to enter the across and down questions. Place the cursor in the correct box for the one across question and press SHIFT 'A'. The normal multicolored input cursor flashes, waiting for the question. Follow the same procedure for down questions, but press SHIFT 'D'.

Output to cassette is accomplished by pressing the '(' (open parenthesis). Before doing this, test the puzzle by pressing SHIFT-CLEAR. The words should clear. To play, move the cursor to one across and press SHIFT 'D' to produce the question. Note the timer and score in the upper right corner. This is the time used in solving the puzzle and the number to the left of score is the maximum score for this puzzle. Each correct letter scores one point and prints. Each incorrect letter scores one with no print and the use of '@' to show an unknown letter scores zero. After viewing a question, the space bar moves the cursor in the question's direction (across or down) for convenience during input.

Any mistakes in making or copying the puzzle are corrected in the 'M' making mode. You can change modes by pressing '&', then pressing '&' again to return to the 'L' load mode. Try this a few times; it is a little tricky. Test the mode change by viewing the screen (stopping at `END PROGRAM - [=]`) in the 'L' mode. This is the method to edit mistyped words or questions. For example, for a mistyped word in question one, change back to input mode 'M', reenter the question, then return to the output mode 'L' and check if the output is correct.

There are two more keys to use. Pressing '=' to end program displays the final time and score. The other key, '!',

---

Rolla Price, a computer instructor and programmer who teaches BASIC on any system, but programs specifically on the CoCo, lives in Sulphur Springs, Missouri.

for start over, totally erases (be careful!) the crossword and returns to the opening menu.

The best crossword puzzles have symmetry. A symmetrical crossword balances the black boxes; every down box has an up box and every left box has a right box. *Word+* follows this rule: If there is no box or a black box to the left of a box, this is the beginning of an across word, or if there is a black box or no box above this box, it is the beginning of a down word. So, follow the symmetry, use that creativity and have fun with *Word+*.

(You may direct any questions about this program to the author at P.O. Box 36, Sulphur Springs, MO 63083, phone 314-464-2021. Please enclose an SASE when writing.) ☐

Figure 1

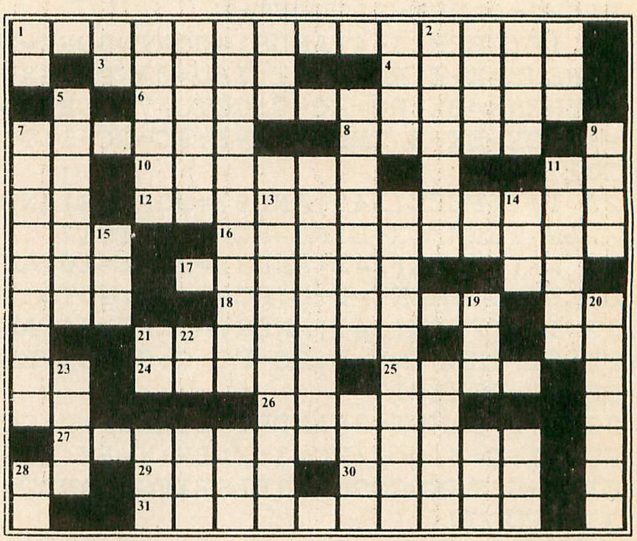
Across

1. Creator of CoCo Cat
3. Her first name is pronounced "Utah"
4. The Delphi username of "KISSable OS-9's" author
6. Jutta Kapfhammer enjoys receiving these
7. Greek oracle or telecommunications network
8. Deep in the heart of Texas
10. Wishing RAINBOW readers' well
12. Database manager of Delphi's CoCo SIG
16. He and his son appeared on the 1985 Simulation Issue cover
17. Most hackers want more for their CoCo
18. A gentle landing on pillows
21. RAINBOW's construction man at work
24. Beginners' "drill instructor"
25. This Ph.D. keeps an eagle's eye on education trends
26. She hosts RAINBOW's art show
27. RAINBOWMAG's SIGop on Delphi's CoCo SIG
29. His programs promote the learning process
30. He makes easy access of applying programs
31. Founder of THE RAINBOW

Down

1. Our newest RAINBOW staff editor's first name
2. Roy G. Biv and a pot of gold
5. Readers' guide to new products
7. Hardware is his forte
9. Angela Kapfhammer appeared in the 1985 Holiday Issue wrapping a present in this pharmacy
11. He's a real buffer stuffer
13. She "toasted" the 1986 Utilities Issue
14. Don't try an Adventure without drawing one
15. RAINBOW's sister publication
19. Binary is base ______
20. The language most easily understood by computers
22. Everyone hates this error!
23. Its best friend is THE RAINBOW
28. Error message indicating no more room

Inside the RAINBOW



The Crossword Creator Contest

The above is not a symmetrical crossword puzzle, but can you guess the correct answers? Or, would you like an even greater challenge? Can you design a different symmetrical crossword puzzle with the *Word+* program and the specifications outlined in the article? If so, you may wish to enter the Crossword Creator Contest. And, if you are chosen a winner you will be awarded a prize and your puzzle will be published in RAINBOW! For more details, see Page 250 of this issue.

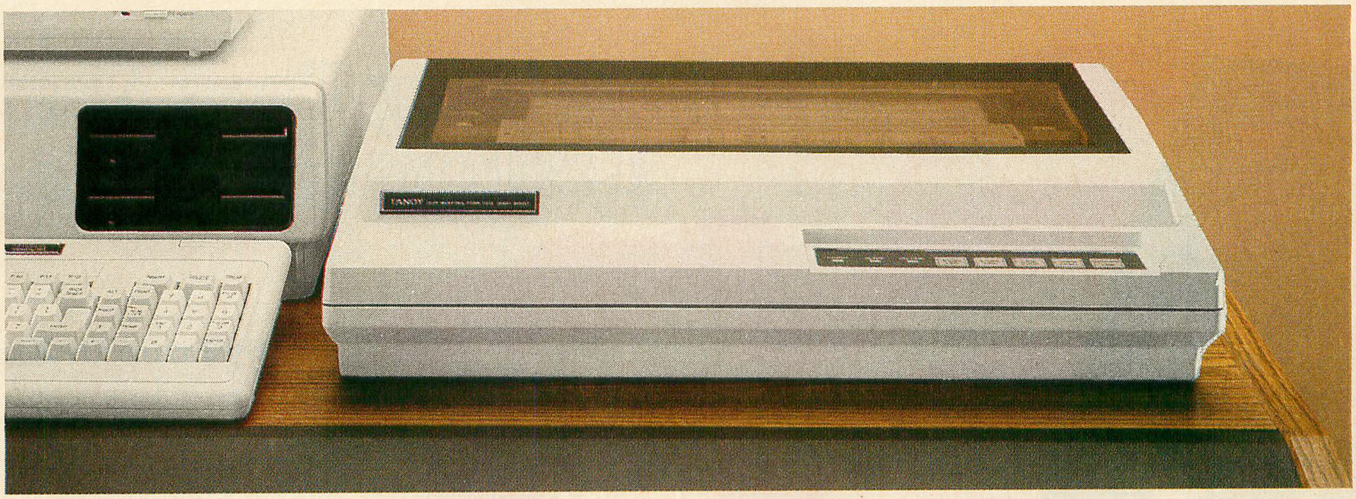
Editor's Note: The following program produces no printer output. However, for your enjoyment, we have created the crossword grid shown above with *Word+* and a screen dump program.

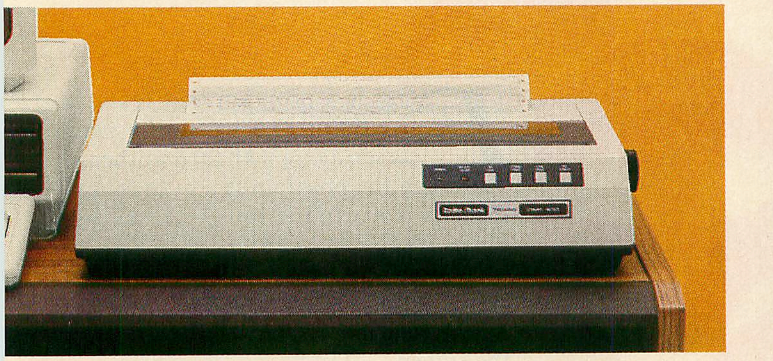
The listing: WORD+

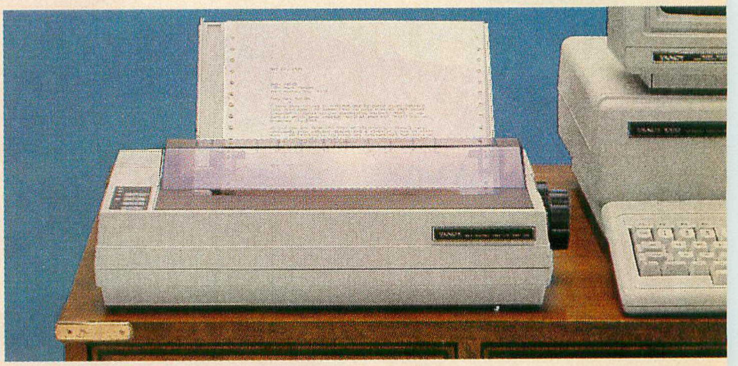
```
10 'WORD+ by Rolla Price 3/12/85
11 CLEAR3000:DIM U(2,2),L$(25),D
W$(75),AC$(75):E=16:D=12:I=1:FOR
L=0 TO 25:READL$(L):NEXT:OP$="WO
RD WORD":DL$="V0L5C":DEF FNU(M)=
ASC(MID$(RC$,RC,1))-32:DEF FNF(K
)=ASC(INKEY$+CHR$(0)):DEF FNT(A)
=ASC(MID$(TA$,RC,1)):DEF FNY(A)=
ASC(MID$(YA$,RC,1))
12 CLS:POKE282,1:FOR P=47 TO 304
STEP32:PA=INT(P/32):PRINT@P,MID$
(OP$,PA,1):PRINT@180-PA,USING"%
      %";MID$(OP$,1,PA):PLAYDL$:
NEXT:DL$="L255C"
13 PRINT@357,"PRESS L TO LOAD WO
RDS","     PRESS M TO MAKE WORDS
",,,"  NOTE:  PRESS [?] FOR HEL
P";:M$=INKEY$:IFM$="L" THEN O=1:
GOSUB 40ELSEIFM$="M" THEN O=0:PR
INT@357,;:INPUT"ROWS .......(1-1
5)";R:PRINT@389,;:INPUT"COLUMNS
....(1-15)";C ELSE 13
14 IF R>15 OR R<1 OR C>15 OR C<1
THEN 12 ELSE W=(15-C)*8:H=(15-R)
*6:BX=W+6:EX=246-W:IF (15-R)/2=I
NT((15-R)/2) THEN BY=H+9:EY=189-
H ELSE BY=H+3:EY=183-H
15 PMODE3:COLOR1,0:PCLS:POKE282,
0:FORY=BY TO EY STEP D:LINE(BX,Y
)-(EX,Y),PSET:NEXT:FOR X=BX TO E
X STEP E:LINE(X,BY)-(X,EY),PSET:
NEXT:X=BX:Y=BY:RC=1:TIMER=0:PMOD
E4:LINE(BX-2,BY-2)-(EX+3,EY+2),P
RESET,B:IF O=0 THEN TA$=STRING$(
R*C,32):RC$=TA$:YA$=TA$
16 SCREEN1:IF O=1 THEN TA$=MID$(
TA$,2-M,R*C):RC$=MID$(RC$,2-M,R*
C):YA$=STRING$(R*C,32):FOR B=BY
TO EY-D STEP D:FOR A=BX TO EX-E
STEP E:J=J+1:IF MID$(TA$,J,1)="*
"THEN K=K+1:LINE(A+2,B+1)-(A+15,
B+11),PRESET,BF:NEXT A,B ELSE NE
XT A,B
```

```
17 IFINT(TIMER/60)>59THENMI=MI+1
:TIMER=0:GOTO17ELSEPUT(X+2,Y+1)-
(X+E-1,Y+D-1),U,NOT:T=FNF(K):PUT
(X+2,Y+1)-(X+E-1,Y+D-1),U,NOT:N=
FNU(M):IFQ>0THENRETURN
18 IFT=65ANDN>0THENU=9:GOSUB35EL
SEIFT=68ANDN>0THENU=10:GOSUB36EL
SEIFO=0AND(T>96ANDT<128)THEN29EL
SEIFO=1ANDT=32THENT=U
19 IF(PEEK(344)AND8)=0ORT=9ORT=3
2THENX=X+E:RC=RC+1:IFO=0ANDX>EX-
E THENX=BX:RC=RC-C:GOTO17ELSEIFO
=1ANDX>EX-E THENX=X-E:RC=RC-1:GO
TO17
20 IF((PEEK(343)AND8)=0ORT=8)AND
X>BX THENX=X-E:RC=RC-1:GOTO17
21 IF((PEEK(342)AND8)=0ORT=10)AN
DY<EY-D THENY=Y+D:RC=RC+C:GOTO17
22 IF((PEEK(341)AND8)=0ORT=94)AN
DY>BY THENY=Y-D:RC=RC-C:GOTO17EL
SEIFT=0THEN17
23 IFO=0ANDT=35ANDRC=1THENF=0:GO
SUB33:T=0:Q=0:RC=1:X=BX:Y=BY ELS
EIFT=63THENGOSUB41ELSEIFO=0ANDT=
33THENRUN
24 IFT=64ANDFNT(A)<>42THENT=FNT(
A)ELSEIFT=FNT(A)ANDT<>42ANDT<>FN
Y(A)THENSC=SC+1
25 IFO=0ANDT=40THENPOKE282,1:GOS
UB39:POKE282,0:SCREEN1ELSEIFT=38
THEN O=ABS(NOT O*-1):SC=0ELSEIFT
=61THENCLS:GOTO37
26 IFO=0ANDT=12THENLINE(X+2,Y+1)
-(X+E-1,Y+D-1),PSET,BF:MID$(TA$,
RC,1)=" "
27 IFO=0ANDT=43THENLINE(X+2,Y+1)
-(X+E-1,Y+D-1),PRESET,BF:MID$(TA
$,RC,1)="*"
28 IFT=92THENO=1:M=1:J=0:K=0:MI=
0:SC=0:GOTO15
29 IFY<93THENY1=Y:I=1ELSEIFY=>93
THENY1=Y-96:I=3
30 IFT=0ORFNY(A)>32ORT<97ORT>127
ORPPOINT(X+2,Y+7)=0THEN17
31 IFO=1AND T<>FNT(A) THENSC=SC-
1:GOTO17ELSEIFO=0+Q AND FNT(A)>3
2THEN17
32 PMODE1,I:DRAW"C1S8BM"+STR$(X+
4)+","+STR$(INT((Y1+3)/.5))+L$(T
-97):PMODE4:IFO=0ANDQ=0THENMID$(
TA$,RC,1)=CHR$(T):GOTO17ELSEIFO=
1THENMID$(YA$,RC,1)=CHR$(T):GOTO
17ELSE17
33 FOR B=BY TO EY-D STEP D:FOR A
=BX TO EX-E STEP E:Q=Q+1:IF(PPOI
NT(A+5,B-2)=0 OR PPOINT(A-2,B+5)
=0) AND PPOINT(A+2,B+7)=1 THEN F
=F+1:MID$(RC$,Q,1)=CHR$(32+F)
34 RC=Q:T=FNT(A):X=A:Y=B:GOSUB29
```

```
:NEXT A,B:RETURN
35 IFPPOINT(X-2,Y+5)=1THENRETURN
ELSECLS:PRINT@132,N;"ACROSS:":PR
INT@197,;:IFO=0THENPOKE282,1:LIN
EINPUTAC$(N):SCREEN1:RETURNELSEP
RINTAC$(N):GOTO37
36 IFPPOINT(X+5,Y-2)=1THENRETURN
ELSECLS:PRINT@132,N;"DOWN:":PRIN
T@197,;:IFO=0THENPOKE282,1:LINEI
NPUTDW$(N):SCREEN1:RETURNELSEPRI
NTDW$(N)
37 PRINT@53,USING"time ##:##";MI
;INT(TIMER/60):PRINT@81,USING"##
# score ###-";R*C-K;SC:IF T=61 T
HEN PRINT@236,"THE END":END
38 PRINT@452,"PRESS [ENTER] TO R
ETURN":IFQ$=INKEY$THEN38ELSESCRE
EN1:POKE282,0:RETURN
39 CLS:INPUT"READY TO RECORD Y/N
";D$:IF D$="N" THEN RETURN ELSE
INPUT"NAME WORDS";G$:OPEN"O",#-1
,G$:PRINT#-1,"@"+TA$,"@"+RC$,R,C
,F:FOR S=1 TO F:PRINT#-1,AC$(S),
DW$(S):NEXT:CLOSE#-1:RETURN
40 CLS:INPUT"READY TO PLAY Y/N";
D$:IF D$="N" THEN 12 ELSE INPUT"
NAME WORDS";G$:OPEN"I",#-1,G$:IN
PUT#-1,TA$,RC$,R,C,F:FOR S=1 TO
 F:INPUT#-1,AC$(S),DW$(S):NEXT:C
LOSE#-1:RETURN
41 CLS:PRINT@8,"USE THESE KEYS T
O:"," MOVE CURSOR - ARROWS & SPA
CEBAR";" I/O ACROSS QUESTION - S
HIFT A"," I/O DOWN QUESTION - SH
IFT D"," PRINT WORDS - ALL LETTE
RS"," PRINT UNKNOWN LETTER - [@]
"," CLEAR WORDS - SHIFT CLEAR","
 END PROGRAM - [=]"
42 IF O=1 THEN 38 ELSE PRINT" PA
INT BOX BLACK - [+]"," ERASE BOX
 - [CLEAR]"," NUMBER AND REVEAL
BOXES - [#]"," CHANGE PROGRAM MO
DE - [&]"," OPEN CASSETTE OUTPUT
 - [(]"," START OVER - [!]":GOTO
38
43 DATA BD6U2NR4U2E2F2D4,R3F1D1G
1NL2F1D1G1L2NU6L1,BD2D3F1R2E1BU4
H1L2G1,BR1D6L1R3E1U4H1L3R1,NR4D3
NR3D3R4,NR4D3NR3D3,BD1D4F1R3U3NL
1BU3L3G1,D6U3R4NU3D3,BR1R2L1D6L1
R2,BD4D1F1R2E1U5,D6U2E4BD6H3,D6R
4,BR4ND6G2H2D6
44 DATA BD6U6F4ND2U4,BR1G1D4F1R2
E1U4H1L2,ND6R3F1D1G1L3,BD1D4F1R2
E1U4H1L2G1D3BR2F2,ND6R3F1D1G1L3B
R1F3,BD5F1R2E1H4E1R2F1,R4L2D6,D5
F1R2E1U5,D4F2E2U4,D6E2F2U6,D1F4D
1BL4U1E4U1,D2F2ND2E2U2,R4D1G4D1R
4
```







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Oh, Long May They Wave: a Salute to the Flags

By Ernie Di Zazzo

Flags is a program that features five different flags on the same screen along with their anthems. Although the program is a little long, I think it is worth the time spent keying in the listing.

Type in the listing, CSAVE and then run it. After the first display, press any key and the flags will roll one-by-one on the screen.

(You may direct questions about this program to the author at 10800 A Esplanade Avenue, Montreal, Quebec H3L 2Y6, phone 514-334-0929. Please enclose an SASE when writing.) ☐

Ernie Di Zazzo is a 67-year-old World War II veteran from Montreal, Canada. A former statistician with an electronic company, his hobby is his CoCo and programming.

The listing: FLAGS

```
1 '**************************
2 '**         FLAGS        **
4 '**   BY.ERNIE.DI ZAZZO. **
5 '** 10800A.ESPLANADE AVE **
6 '**  MONTREAL   H3L-2Y6  **
7 '**  QUEBEC      CANADA  **
8 '**************************
10 CLEAR 500
20 CLS(1):PRINT@96,")*(*)*SALUTE
 TO  THE FLAGS*(*)*(
       ";:PRINT @ 168,"BY E.DI Z
AZZO.    ";
30 PRINT@35,"*A TRIBUTE TO THE R
AINBOW*"
40 PRINT@196,"  MUSIC TRANSCRIBE
D BY          M. MARANDOLA & E.D
I ZAZZO."
45 PRINT"***********************
*********
50 PRINT"      FLAGS PRESENTED A
RE"
60 PRINT" (1)ENGLAND.(2)QUEBEC.(
3)U.S.A.        (4)ITALY.(5)CANA
DA."
70 PRINT"    **WITH THEIR ANTHEM
S**              PRESS ANY KEY"
100 A$=INKEY$:IFA$=""THEN100 ELS
E IFA$="K"GOTO 110
```

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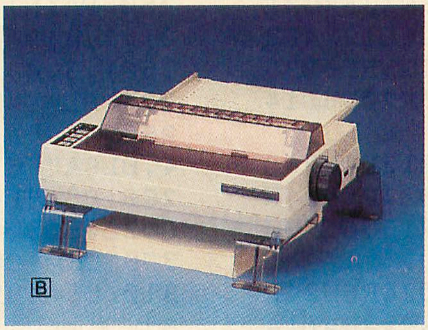

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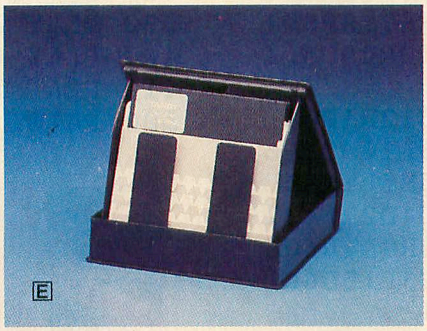
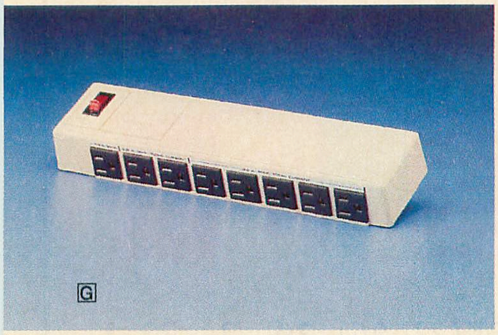
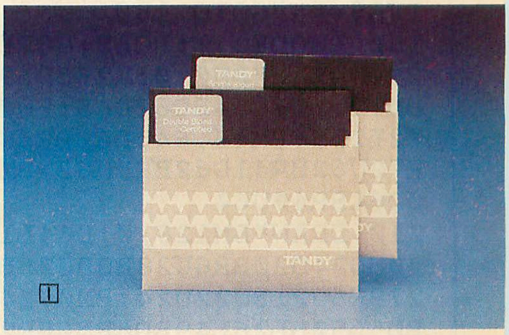
Cleaning Solution





H
Computer Paper
Computer Paper
14⅞ x 11"



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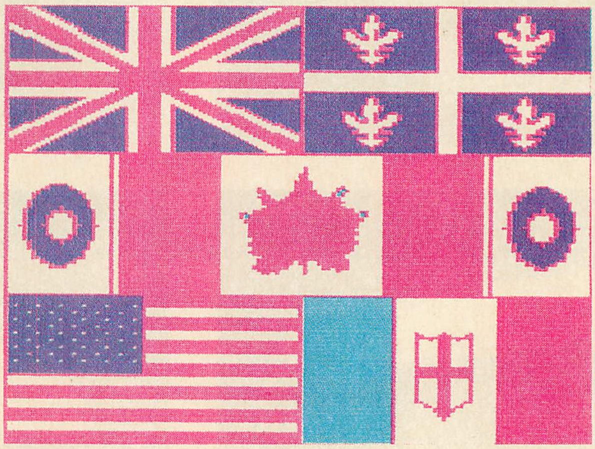
```
110 PMODE 4,1:PCLS:SCREEN1,1
120 DRAW"BM114,5;BD5D25R6U8R12D8
R6U25H5L14G5BD4BR6D6R12U6H2L8G2
130 DRAW"BM37,52;BD5D9F3R13F3G3L
15D6R19E4U9H4L12H3E3R15U6L19G4BR
35D25R6U8R12D8R6U25H5L14G5BD4BR6
D6R12U6H2L8G2BR30BU10D30R20U6L14
U24L6
140 DRAW"BM137,50;D26F4R12E4U26L
6D20G3L2H3U20L6BR29D6R9D24R6U24R
9U6L24BR34D30R20U6L14U6R10U6L10U
6R14U6L20
150 DRAW"BM40,100;D6R12D24R6U24R
12U6L30BR40BD4D22F4R14E4U22H4L14
G4BD4BR6D14R10U14L10BR50BU8D6R11
D24R6U24R11U6L28BR35D30R6U12R8D1
2R6U30L6D12L8U12L6BR30D30R20U6L1
4U6R10U6L10U6R14U6L20
160 DRAW"BM57,155;D30R6U12R10U6L
10U6R14U6L20BR30D30R20U6L14U24L6
BR30BD5D25R6U8R12D8R6U25H5L14G5B
D4BR6D6R12U6H2L8G2BR30BU4D22F4R1
6E3U10L10D4R4D4L8H3U14E3R8D4R6U6
H3L16G4BR35BD2D9F3R13F3G3L15D6R1
9E4U9H4L12H3E3R15U6L19G4
170 A$=INKEY$:IFA$=""THEN170ELSE
IFA$="K"GOTO 180
180 PMODE3,1:PCLS:SCREEN1,0
200 DRAW"BM0,0;R255D191L255U191;
BM128,0;D64BD62D65;BM0,64;R255BD
62L255;BM46,64;D62BR5U62BR42D62B
R72U62BR41D62BR5U62;BM128,126;R4
0D64BR46U64
210 DRAW"BM128,0;D64L128;BM53,0D
20BD24D20BR6U28BU9U26BR7D26BD10D
27BR6U21BU22U24;BM0,24R32BR60R34
BD5L50BL26L49BD6R50BR22R55BD5L35
BL60L35
220 LINE(0,10)-(33,24),PSET:LINE
(12,0)-(50,20),PSET:LINE(0,6)-(5
0,28),PSET:LINE(4,0)-(57,27),PSE
T:LINE(74,20)-(115,0),PSET:LINE(
68,27)-(123,0),PSET:LINE(73,29)-
(126,4),PSET:LINE(92,24)-(127,8)
,PSET
230 LINE(0,55)-(34,40),PSET:LINE
(0,59)-(53,35),PSET:LINE(4,64)-(
56,37),PSET:LINE(10,64)-(50,44),
PSET:LINE(92,40)-(127,55),PSET:L
INE(72,35)-(127,59),PSET:LINE(66
,36)-(123,63),PSET:LINE(73,43)-(
115,64),PSET
240 PAINT(64,5),4,4:PAINT(5,38),
2,4:PAINT(5,28),2,4:PAINT(55,12)
,2,4:PAINT(70,10),2,4:PAINT(100,
25),2,4:PAINT(100,37),2,4:PAINT(
70,45),2,4:PAINT(55,47),2,4
250 PAINT(40,5),3,4:PAINT(90,5),
3,4:PAINT(5,20),3,4:PAINT(120,20
),3,4:PAINT(5,45),3,4:PAINT(120,
45),3,4:PAINT(45,55),3,4:PAINT(8
0,55),3,4
260 PAINT(10,40),3,4:PAINT(115,4
0),3,4:PAINT(50,50),3,4:PAINT(72
,50),3,4
270 PLAY"T2V3102"
280 A$="L4GGAL4.F#L8GL4ABBO3CO2L
4.BL8A"
290 B$="L4GAGF#L3.GL4O3DDDL4.DL8
CO2L4BO3"
300 C$="CCCL4.CO2L8BL4A"
310 D$="BL8O3CO2BAGL4.BO3L8CL4DL
8"
320 E$="ECL4O2BAL3.G"
390 PLAY A$+B$
400 PLAY C$+D$
410 PLAY E$
500 PAINT(20,65),2,4:PAINT(245,6
5),2,4:CIRCLE(21,96),20,,1,.79,1
.21:CIRCLE(27,96),20,,1,.30,.70:
CIRCLE(229,96),20,,1,.81,1.19:CI
RCLE(237,96),20,,1,.31,.70:CIRCL
E(24,96),9:CIRCLE(233,96),9
505 PAINT(25,80),3,4:PAINT(235,8
0),3,4:PAINT(49,96),2,4:PAINT(20
9,96),2,4
510 DRAW"BM128,0;BR58D28L56BD9R5
6D26BR10U26R56BU9L56U28
520 A$="F2D1F2D1G1D1G1D2R1E1R1E3
R3F1D2G3L2G2R3D1L6D2R4D1G2L2G2BU
23G2D1G2D1F1D1F1D2L1H1L1H3L3G1D2
F3R2F2L3D1R6D2L4D1F2R2F2
530 DRAW"BM158,3"+A$:DRAW"BM225,
3"+A$
540 DRAW"BM158,39"+A$:DRAW"BM225
,39"+A$
560 PAINT(190,3),2,4:PAINT(158,1
0),2,4:PAINT(225,10),2,4:PAINT(1
58,50),2,4:PAINT(225,59),2,4
570 PAINT(155,3),3,4:PAINT(222,3
),3,4:PAINT(155,39),3,4:PAINT(22
```



```
2,39),3,4
580 PLAY"V31O3T3"
590 A$="L4O3AGFL2.O4CL4O3AGFL2.O
4DL4O3GB-O4DL2CL4CL2CL4DL2.CO3L4
AGFO4L2.C"
600 B$="O2L4AGFO3L2.DO2L4GB-O3DL
2CO2L4FL2AL4GL2.F"
610 PLAYA$+B$+A$+B$
620 DRAW"BM0,161;R128BL68U35BD5R
68BD5L68BD5R68BD5L68BD5R68BD5L68
BD10NL68R68D5L128BD5R128BD5L128B
D5R128BD5L128
630 PAINT(5,134),3,4
640 COLOR2:CIRCLE(5,131),1:CIRCL
E(15,131),1:CIRCLE(25,131),1:CIR
CLE(35,131),1:CIRCLE(45,131),1:C
IRCLE(56,131),1:CIRCLE(10,134),1
:CIRCLE(20,134),1:CIRCLE(30,134)
,1:CIRCLE(40,134),1:CIRCLE(51,13
4),1
650 CIRCLE(5,137),1:CIRCLE(15,13
7),1:CIRCLE(25,137),1:CIRCLE(35,
137),1:CIRCLE(45,137),1:CIRCLE(5
6,137),1:CIRCLE(10,140),1:CIRCLE
(20,140),1:CIRCLE(30,140),1:CIRC
LE(40,140),1:CIRCLE(51,140),1
660 CIRCLE(5,143),1:CIRCLE(15,14
3),1:CIRCLE(25,143),1:CIRCLE(35,
143),1:CIRCLE(45,143),1:CIRCLE(5
6,143),1:CIRCLE(10,146),1:CIRCLE
(20,146),1:CIRCLE(30,146),1:CIRC
LE(40,146),1:CIRCLE(51,146),1
670 CIRCLE(5,149),1:CIRCLE(15,14
9),1:CIRCLE(25,149),1:CIRCLE(35,
149),1:CIRCLE(45,149),1:CIRCLE(5
6,149),1:CIRCLE(10,152),1:CIRCLE
(20,152),1:CIRCLE(30,152),1:CIRC
LE(40,152),1:CIRCLE(51,152),1
680 CIRCLE(5,155),1:CIRCLE(15,15
5),1:CIRCLE(25,155),1:CIRCLE(35,
155),1:CIRCLE(45,155),1:CIRCLE(5
6,155),1
690 PAINT(64,129),4,4:PAINT(64,1
33),2,4:PAINT(64,137),4,4:PAINT(
64,142),2,4:PAINT(64,150),4,4:PA
INT(64,155),2,4:PAINT(64,160),4,
4:PAINT(64,165),2,4:PAINT(64,170
),4,4:PAINT(64,175),2,4:PAINT(64
,180),4,4:PAINT(64,185),2,4:PAIN
T(64,190),4,4
700 PLAY"V31O2T2"
710 A$="L8.FL8DO1L4B-O2DFL2B-L8.
O3DL8C"
720 B$="O2L4B-DEL2FL8FFO3L4.DL8C
O2L4B-"
730 C$="L2AL8GAL4B-B-FDO1B-O2L8.
```

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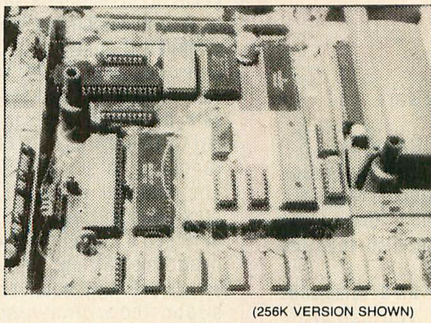

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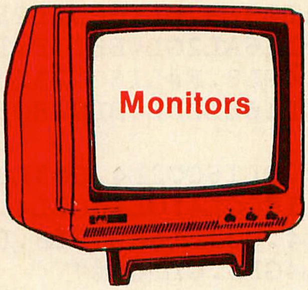

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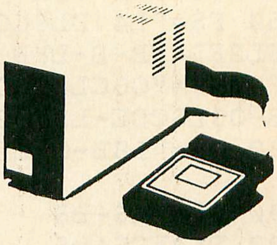

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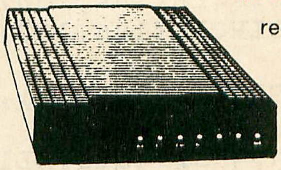

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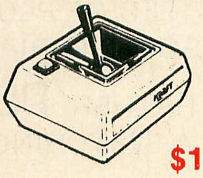

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740 D$="L4B-DEL2FL8FFO3L4.DL8CO2
L4B-L2AL8GAL4B-B-F"
750 E$="DO1B-O3L8DDL4DE-FL2FL8E-
DL4CDE-L2E-L4E-"
760 F$="L4.DL8CO2L4B-L2AL8GAL4B-
DEL2FL4FB-B-L8B-AL4GGG"
770 G$="O3CL8E-DCO2B-L4B-AL8FFL4
.B-O3L8CDE-L2FO2"
780 H$="L8B-O3CL4.DL8E-L4CO2L2B-
"
790 PLAYA$+B$
800 PLAYC$+D$
810 PLAYE$+F$
820 PLAYG$+H$
900 PAINT(195,129),2,4:PAINT(245
,129),4,4
910 DRAW"BM178,140;C4;BD2D30BR25
U30;BM189,145;D12L11BD4R11D14BR3
U14R11BU4L11U12
920 CIRCLE(174,189),20,,.99,.81,
.90:CIRCLE(206,189),20,,.99,.60,
.71:CIRCLE(184,138),10,,.80,.12,
.36:CIRCLE(196,138),10,,.80,.12,
.37
930 PAINT(190,148),4,4
950 PLAY"T2V31"
960 A$="O2L4DL8.DL16EL2DL4BL8.BO
3L16CO2L2BL4BO3L8.DL16CO2L2BL4AL
8.BL16AL2GL4DL8.DL16EL2DL4BL8.BO
3L16CO2L2BL4BO3L8.DL16CO2L2BL4A"
970 B$="L8.BL16AL2GL4BBL2F#L8GL8
AL8GL8F#L2EL4GL8.F#L16GL2AL4DL2B
O3L4CO2DL8.DL16EL2DL4BL8.BO3L16C
O2L2BL4B"
980 C$="O3L8.DL16CO2L4.BO3L8DO2L
8AO3DO2L4.GL16GGL4.GL16GGL4.GL16
GGL8GG#ABO3L4.CO2L16EL4EL8.EL16C
L4FL8.EL16GL4GL8.GL16F#"
990 D$="L4AL8.GL16GL4GL8.AL16BO3
L4CO2L8.EL16FL4AL8.GL16EL4FL8.DL
16DL4DL8.DL16C#L4EL8.DL16FL4FL8.
FL16EL4GL8.FO3L16DL4DL8.DL16C"
1000 E$="O2L4BL8.BL16AL4GL8.GL16
FL4.EL16EL4EL8.EL16D#L4FL8.EL16E
L4EL8.DL16CL4DO1L8.GO2L16EL4EL8.
EL16D#L4FL8.EL16EL4EL8.DL16E"
1010 F$="O1L4.GO2L16EL4EL8.EL16D
L4FL8.EL16GL4GL8.F#L16GL4BL8.AL1
6AL8.AL16BO3L8.CL16DL4EL8.EL16EL
4DL8.DL16DL4CC"
1020 PLAY A$+B$
1030 PLAY C$+D$
1040 PLAY E$+F$
1110 DRAW"BM130,70;D2F1D2F1D2F1D
1R1D2E1F2R1F1D1E1R1E6D1F1G2R1G2F
1G2R2F2D1E2D1F2E2R2D2G4D1G1L1F2G
2F2G2F1L2D1L3H1L3D1R3F3L1F1L1F2L
1D1L2G1L1H2G1H1L1H1D2H4L2H2ND8
1120 DRAW"BM130,70;D2G1D2G2D2G1D
1L1D2H1G2L1D1G1D1H2L1H6D1G1F2L1F
2G1F2L2G2D1H2D1G2H2L2D2F4D1F1R1G
2F2G2F2G1R2D1R3E1R3D1L3G3R1G1R1G
2R1D1R2F1R1E2F1R1E1D2E2R2E4F2
1130 PAINT(80,70),4,4:PAINT(128,
66),2,4:PAINT(195,70),4,4:PAINT(
130,80),4,4
1140 PLAY"V31O2T2"
1150 A$="L2AO3L4.CL8CO2L2.FL4GL4
AO2B-O3CDO2L1GL2AL4.BL8BO3L2.CL4
D"
1160 B$="O3L4EEDDL2.CO2L8.GL16AL
4.B-L8AL4GL8.AL16B-O3L4.CO2L8B-L
4AO3L4CO3L4DCO2L4B-A"
1170 C$="O2L2.GL8.GL16AL4.B-L8AL
4GL8.AL16B-L4.O3CO2L8B-L4AAGO3L4
CL8CO2BO2L8ABO3L1C"
1180 D$="O2L2AO3L4.CL8CO2L1FL2B-
O3L4.DL8DO2L1GO3L2CL4.C#L8C#L4DO
2L4B-AG"
1190 E$="O2L2FGL1AO3L2CL4.FL8FL4
DO2L4B-AGO3L2CL2EL1F"
1200 PLAY A$+B$
1210 PLAY C$+D$
1220 PLAYE$
1300 GOTO1300
```

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- Un-DISK will work even if you already own a disk but WHY BUY A DISK AT ALL?
- Un-DISK should be in the library of every serious CoCo user even if you own a disk says Frank J. Esser, independent reviewer for RAINBOW Magazine!

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The foursome had gathered and to the CoCo were wed . . .

As Visions of the Pro-Am Danced in Their Heads

By Matt Krom

Step up to the ball and analyze the green in front of you. After deciding in which direction and with how much force to putt, slowly start the backswing . . .

No, this isn't the local miniature golf course. You are sitting comfortably at home playing nine holes of miniature golf on your CoCo. *MiniGolf* requires Extended Color BASIC and at least 16K RAM. However, 16K users may need to `PCLEAR 2` before loading.

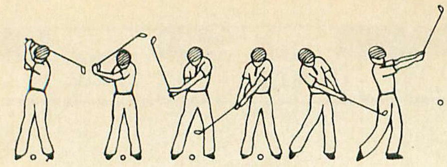
When the program is run, there is first a title screen and then a screen giving a choice between beginner or expert play. Simply type `B` or `E` to indicate your choice. If the beginner skill level is chosen, then one is added to the par of each hole, giving a better chance of finishing under par.

After the computer prepares the hole, it appears on the screen. The walls that your ball bounces off of are red. A blue circle is the cup, and the green area is, of course, the green. A small, yellow dot is the ball. On some screens there are hills that appear onscreen as an arrow pointing in the direction of the incline.

To putt the ball, use the right joystick and aim the ball in the desired direction. Overall, there are 256 possible directions in

---

Matt Krom, a freshman at Argos High School in Argos, Indiana, has been programming on the CoCo for four years. He hopes to become a professional programmer.



which the ball can travel. Hold down the firebutton and watch the red bar shoot up the left side of the screen. This bar determines the force of the putt; the longer the bar, the farther the ball will roll. Release the firebutton when this bar is roughly as long as you want the shot to be. Pay careful attention to the force of the putt. On certain holes, putting too far past the cup results in the ball rolling down a hill or dropping down a pipe to somewhere else.

After each hole, the computer gives the results and tells how much you are over or under par. At the end of nine holes, you are asked if you want to play again.

As with any other program, go ahead and explore or modify different parts of it. It's a great way to learn new programming techniques.

(You may contact the author of this program with any questions at 101610 18th Road, Argos, IN 46501, phone 219-892-5226. Please include an SASE when writing.) ☐

Description of Program Lines

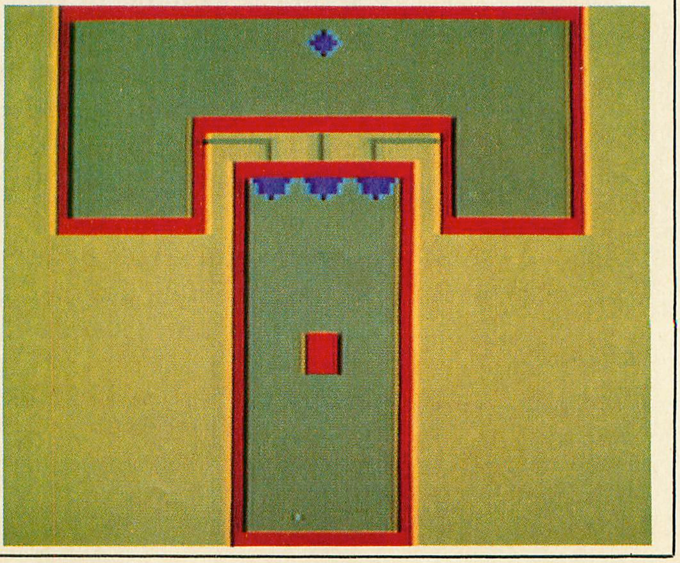
40 — 60	Read joystick
70 — 90	Wait until player releases button
100 — 180	Move ball for length of shot
190 — 280	Check to see if ball stopped on a hill
290 — 520	When ball goes into cup, check to see if it should travel through a pipe
530 — 540	If shot is too hard, ball rolls past cup
570 — 600	Title screen
610 — 620	Skill level screen
630 — 800	Loop for all nine holes
810 — 840	Final screen
870 — 900	Draw hole #1
910 — 960	Draw hole #2
970 — 1010	Draw hole #3
1020 — 1090	Draw hole #4
1100 — 1170	Draw hole #5
1180 — 1240	Draw hole #6
1250 — 1330	Draw hole #7
1340 — 1410	Draw hole #8
1420 — 1490	Draw hole #9

Description of Program Variables

H, V = Horizontal and vertical location of ball
F, G = Horizontal and vertical increments of ball travel
P = Force of putt
Z = Firebutton reading
HO = Hole number
PA = Par for hole
TP = Par for all holes played
SC = Score for all holes played
S = Number of strokes on hole

The listing: MINIGOLF

```
10 GOTO570
20 P=190:COLOR4,2:PSET(H,V,2)
30 FORX=1TO600:NEXT
40 X=JOYSTK(0):Y=JOYSTK(1)
50 F=(X-31)/31*2:G=(Y-31)/31*2
60 Z=PEEK(65280):IFZ=126ORZ=254T
HEN70ELSE40
70 COLOR4:P=P-4:LINE(4,P)-(4,P+4
),PSET
80 IF P=2 THEN 100
90 Z=PEEK(65280):IF Z=126 OR Z=2
54 THEN 70
100 PLAY"O5;L32;B;G;C":S=S+1:FOR
K=1 TO (190-P) STEP2
110 IFCO=1THENPSET(H,V,4)ELSE IF
CC<>2THEN PSET(H,V,1)ELSE CC=0EL
SE PSET(H,V,1)
120 H=H+F:V=V+G
130 IFPPOINT(H,V)=2THEN CC=2
140 IF PPOINT(H,V)=3 THEN 290
150 IF PPOINT(H,V)<>4 THEN CO=0:
PSET(H,V,2):NEXT K:GOTO190
160 PLAY"O2;L32;A-;A"
170 IF PPOINT(H-F,V)=1 THEN F=-F
 ELSE IFPPOINT(H,V-G)=1 THEN G=-
G ELSE F=-F:G=-G
180 H=H+F:V=V+G:GOTO150
190 'SHOT IS FINISHED
200 IFHO=5ANDH>134AND H<192ANDV<
100THEN 210 ELSE230
210 PT=1
220 PSET(H,V,PT):H=H-2:PT=PPOINT
(H,V):PSET(H,V,2):IF H>114 THEN
FORL=1TO15:NEXT:GOTO220
230 IFHO<>7THEN270
240 IF H>196AND V>102AND V<160TH
EN 250ELSE270
250 PT=1
260 PSET(H,V,PT):V=V+2:PT=PPOINT
```



```
(H,V):PSET(H,V,2):IF V<176THEN F
ORL=1TO10:NEXT:GOTO260
270 REM
280 PSET(H,V,2):P=190:DRAW"C2BM4
,0D190":GOTO40
290 'BALL IS IN CUP
300 IFHO<>4THEN350 ELSEIFV>150TH
EN710
310 GOSUB560
320 IF H>140THEN H=188:V=138:Q=F
:F=G:G=-Q:GOTO150
330 IF H<120THEN H=74:V=138:Q=F:
F=-G:G=Q:GOTO150
340 V=152:GOTO150
350 IFHO<>5THEN390
360 IF V>100THEN710ELSEGOSUB560
370 V=102:G=2:F=RND(10)/10-.5:F=
F*2
380 GOTO150
390 IFHO<>6THEN440
400 IFV<100THEN710
410 GOSUB560
420 IF H>128THENH=188:Q=F:F=G:G=
-Q:GOTO150
430 H=76:Q=F:F=-G:G=Q:GOTO150
440 IF HO<>7 THEN 500
450 IF H<130 THEN710
460 GOSUB560
470 IF H>170THEN Q=F:F=G:G=-Q:H=
150:V=134:GOTO150
480 IF V<92THEN Q=F:F=-G:G=F:H=2
06:V=54:GOTO150
490 H=122:V=90:GOTO150
500 IFHO<>9THEN530
510 IFH<128THENGOSUB560:H=146:V=
174:GOTO150
520 IFH<228ANDV>118THEN710ELSEGO
SUB560:F=-F:H=240:V=92:GOTO150
530 IF(190-P)/(K+3)<2.25THEN550
540 H=H+F:V=V+G:IFPPOINT(H,V)=3T
HEN540 ELSE PSET(H,V,2):GOTO190
550 GOTO710
560 PLAY"O5L64":FORJ=1TO12:PLAYS
TR$(J):NEXT:RETURN
570 CLS3:P$=" COCO MINATURE GOLF
 ":PP=175:P=102:GOSUB850
580 P$=" BY MATT KROM ":P=169:GO
SUB850
590 P$=" PRESS FIRE BUTTON TO BE
GIN ":P=386:GOSUB850
600 Z=PEEK(65280):IFZ=126ORZ=254
THEN610ELSE600
610 CLS2:P$=" DO YOU WANT TO PLA
Y WITH ":P=227:PP=157:GOSUB850:P
$=" bEGINNER'S OR eXPERT'S PARS?
 ":P=257:GOSUB850
```

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```
620 S$=INKEY$:IFS$="B"ORS$="E"TH
EN630ELSE620
630 FOR HO=1 TO 9
640 CLS8:P=224:PP=255:P$="PREPAR
ING COURSE...WAIT A MOMENT":GOSU
B850
650 ON HO GOSUB870,910,970,1020,
1100,1180,1250,1340,1420
660 IF S$="B"THEN PA=PA+1
670 CLS:PRINT@69,"READY TO PLAY
HOLE #"HO:PRINT@109,"PAR"PA
680 PRINT@416,"HIT RED ACTION BU
TTON WHEN READY"
690 ZZ=PEEK(65280):IF ZZ=126OR Z
Z=254 THEN 700 ELSE 690
700 SCREEN1,0:S=0:GOTO20
710 PLAY"O3;L32;C;D;E;G;E;D;C"
720 CLS:PRINT@76,"HOLE #";HO
730 PRINT@100,"PAR"PA"-- YOU MAD
E IT IN"S
740 TP=TP+PA:SC=SC+S
750 PRINT@228,"YOUR CURRENT SCOR
E IS";SC
760 PRINT@262,;:KK=SC-TP:IF SGN(
KK)=1 THEN PRINT"YOU ARE"KK"OVER
 PAR" ELSE IF SGN(KK)=0 THEN PRI
NT"YOU ARE EVEN AT PAR" ELSE PRI
NT"YOU ARE"ABS(KK)"UNDER PAR"
770 IFHO=9THEN810
780 PRINT@416,"HIT RED ACTION BU
TTON WHEN READY"
790 ZZ=PEEK(65280):IF ZZ=126 OR
ZZ=254 THEN 800 ELSE 790
800 NEXT HO
810 PRINT@233,"*FINAL*";
820 PRINT@416,"DO YOU WANT TO PL
AY AGAIN? (Y/N)"
830 X$=INKEY$:IFX$="N"THENCLS:EN
D
840 IFX$="Y"THENRUNELSE830
850 PLAY"L255O4":FORK=15TO0STEP-
1:PRINT@P,STRING$(LEN(P$),PP-K);
:PLAY"A":NEXT
860 PRINT@P,P$;:RETURN
870 PMODE1,1:PCLS2
880 COLOR4:DRAW"BM88,190U120R16U
20L16U50R80D50L16D20R16D120L80":
DRAW"BM92,186U112R16U28L16U42R72
D42L16D28R16D112L72":PAINT(90,18
8),4,4
890 PAINT(94,184),1,4:CIRCLE(148
,20),5,3:PAINT(148,20),3,3
900 PA=3:H=RND(64)+96:V=180:RETU
RN
910 PMODE1,1:PCLS2
920 DRAW"C4BM48,190U130R48U60R60
D60R48D130L156;BM52,186U122R48U6
0R52D60R48D122L148":PAINT(50,188
),4,4:PAINT(128,96),1,4
930 DRAW"BM116,60R4D28L18D48L4U5
2R18U24":DRAW"BM132,60R4D24R18D5
2L4U48L18U28":PAINT(118,62),4,4:
PAINT(134,62),4,4
940 CIRCLE(128,156),5,3:PAINT(12
8,156),3,3
950 V=12:PA=3:IFRND(2)=1THENH=10
4ELSEH=146
960 RETURN
970 PMODE1,1:PCLS2
980 COLOR4:DRAW"BM16,190U134R154
U56R84D120L174D70L64":DRAW"BM20,
186U126R154U56R76D112L174D70L56"
:PAINT(18,188),4,4
990 PAINT(22,184),1,4:CIRCLE(210
,36),5,3:PAINT(210,36),3,3
1000 COLOR4:LINE(120,68)-(162,80
),PSET,BF:LINE(120,96)-(162,108)
,PSET,BF
1010 H=RND(48)+24:V=180:PA=4:RET
URN
1020 PMODE1,1:PCLS2
1030 COLOR4:LINE(96,0)-(164,132)
,PSET,B:LINE(100,4)-(160,128),PS
ET,B:PAINT(98,2),4,4:PAINT(128,8
),1,4
1040 LINE(124,60)-(136,72),PSET,
BF:CIRCLE(110,126),6,3,1,.5,0:CI
```

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Y-CABLE	28.95	23.95	5
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Electronic
Audio
Recognition
System

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Artificial Intelligence and Natural Man
Margaret Bode
PATTERN RECOGNITION
Pavlidis Structural Pattern Recogni
Thinking and the Mind
ENTER
CLEAR
SHIFT

- SPEECH RECOGNITION
- HANDS OFF PROGRAMMING
- HIGH QUALITY SPEECH REPRODUCTION

EARS Does It All!

INCREDIBLE!

Two Years In the Making. Speech Systems was formed to develop new and innovative speech products. After 2 years of intensive Research and Development, we have created a truely sophisticated speech recognition device. Recognition rates from 95% to 98% are typical. Until now, such a product was outside the price range of the personnel computer market, and even small businesses.

EARS is trained by your voice and capable of recognizing any word or phrase. Training EARS to your particular voice print takes seconds. Up to 64 voice prints may be loaded into memory. You may then save on tape or disk as many as you like so that your total vocabulary is virtually infinite.

Speech and Sound Recognition. EARS is really a sound recognition system, so it really doesn't matter whether you speak in English, Spanish, or French. In fact you do not have to speak at all, you can train EARS to understand sounds such as a musical note or a door slamming.

Hands Off Programming. Imagine writing your own BASIC programs without ever touching the keyboard. Everything that you would normally do through a keyboard can now be done by just speaking.

Programming EARS Is Easy. LISTEN, MATCH and other commands have been added to BASIC so that programming EARS is a piece of cake! The single BASIC line: 10 LISTEN: MATCH will instruct EARS to listen to you and return the matching phrase.

It Talks. EARS is also capable of high quality speech. We mean REALLY high quality. The speech is a fixed vocabulary spoken by a professional announcer. Speech Systems is currently creating a library of thousands of high quality words and phrases. For a demonstration call **(312) 879-6844**, you won't believe your ears or our EARS.

DISK OWNERS. EARS will work with any disk system with either a MULTI-PAK or Y-CABLE. Our new Triple Y-CABLE was specifically developed for those wishing to add SUPER VOICE as a third device.

You Get Everything You Need. You get everything you need including a specially designed professional headset style noise cancelling microphone. The manual is easy to use and understand. Several demonstration examples are included so you don't have to write your own programs unless you want to. EARS will work in any 32K or 64K Color Computer.

SUPER VOICE $20 OFF

Imagine talking to your computer and it talking back to you. When you need an unlimited vocabulary, you can't beat SUPER VOICE. For a limited time, we will give you the SUPER VOICE for $59.95 with your EARS purchase. Even if you already have another speech unit, here is your chance to buy the best and save $20.

VOICE CONTROL

Applications for EARS are astounding. Here is our first of many listening programs to come. VOICE CONTROL is a program specifically designed to allow you to control any appliance in your house with your voice and our HOME COMMANDER (sold separately) or the Radio Shack Plug 'N' Power controller. For example, you can control your TV by saying "TV ON" or "TV OFF". . **$24.95**

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EARS SPEECH LIBRARY™ *

NEW!

HIGH INTELLIGIBILITY SPEECH IS HERE

FEMALE VOICES COMING SOON

EARS is far more than a speech recognition system that enables your computer to listen to you. EARS and the EARS SPEECH LIBRARY bring "high quality" speech to the Color Computer. EARS doesn't sound like a "computer" or "robot," it sounds like real people. It sounds natural since we use real people to create the speech.

HERE'S HOW IT'S DONE. Speech Systems has invested nearly $10,000 in special audio digitizing and speech compression equipment. Each phrase is spoken by a human announcer digitized and then compressed so very little memory is used, typically less than 400 bytes per word. For those familiar with the Texas Instruments "SPEAK and SPELL" line of educational toys, you are aware of the results. For those wishing a demonstration, call (312) 879-6844.

FEMALE and CHILDREN'S VOICES COMING SOON. The technique we use is independent of the speaker. A male announcer is presently used, female and young people's voices coming soon.

NOW AREN'T YOU GLAD YOU OWN A COCO!

THE LIBRARY. Each group of the library contains words designed for a particular application. The SCIENTIFIC LIBRARY contains phrases designed for process or home control. The EDUCATIONAL LIBRARY has those words to help ensure keeping a child's attention. Words may be put together to form sentences and easily produced from BASIC, so you can write your own programs with incredible speech quality.

GENERAL 1
EARS SPEECH LIBRARY

AGAIN
ALL
AND
AT
BUY
CALL
CASE
CENT
CLEAR
CLOSE
COMPUTER
CONNECT
DAY
DIAL
DOLLAR
DOWN
DOOR
EAST
END
ENTER
FAST
FASTER
FIFTH
FIRST

GET
GO
HALF
HAVE
HOUR
IN
IS
IT
LEAVE
LEFT
LEVEL
LOVE
MORE
MULTIPLY
NEAR
NEED
NEXT
NICKEL
NO
NORTH
NUMBER
OF
OFF
ON

OUT
PASS
PENNY
PLEASE
QUARTER
READY
REACH
RIGHT
SECOND
SELECT
SEND
SET
START
STOP
SOUTH
THAN
THE
THIRD
TIME
UP
WAIT
WEST
YES
YOU

2 disks $19.95

GENERAL 2
EARS SPEECH LIBRARY

ADD
ASK
ASSISTANCE
AUTO
BUT
COCO
COMPLETE
CONTINUE
COPY
CORRECT
COST
DATE
DECREASE
DEPOSIT
DIME
DIVIDE
DRIVE
ENTRY
EXIT
FLOOR
FORWARD
FROM
GOING
GREAT

HELLO
HELP
HERE
HOLD
INCORRECT
INCREASE
JUST
KEY
LESS
LESSER
LIGHT
LOWER
LOWEST
MONEY
MOVE
NEAR
NEED
NEXT
NOT
NOTICE
ONWARD
OPEN
OR
OVER

PRESS
PLACE
PLAY
POINT
QUICK
RADIO
RECEIVE
RECORD
REPLACE
REVERSE
ROOM
SERVICE
SIDE
SLOW
SLOWER
SPACE
STATION
THANK YOU
THIS
TOTAL
TRY
TURN
USE
YOUR

2 disks $19.95

Alphabet/Numbers
EARS SPEECH LIBRARY

ONE
TWO
THREE
FOUR
FIVE
SIX
SEVEN
EIGHT
NINE
TEN
ELEVEN
TWELVE
THIRTEEN
FOURTEEN
FIFTEEN
SIXTEEN
SEVENTEEN
EIGHTEEN
NINETEEN
TWENTY
THIRTY
FORTY
FIFTY
SIXTY
SEVENTY
EIGHTY
NINETY
HUNDRED

A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
THOUSAND
ZERO

ALPHA
BRAVO
CHARLIE
DELTA
ECHO
FOXTROT
GOLF
HOTEL
INDIA
JULIETT
KILO
LIMA
MIKE
NOVEMBER
OSCAR
PAPA
QUEBEC
ROMEO
SIERRA
TANGO
UNIFORM
VICTOR
WHISKEY
X-RAY
YANKEE
ZULU
MILLION

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SCIENTIFIC
EARS SPEECH LIBRARY

ABORT
ADJUST
ALARM
AMPERE
ATTENTION
BRAKE
BUTTON
CANCEL
CAUTION
CENTIGRADE
CHANGE
CHECK
CONTROL
CURRENT
DANGER
DEGREE
DISK
EMERGENCY
EQUAL
ERROR
EVACUATE
FAHRENHEIT
FAIL
FAILURE

FIRE
FREQUENCY
FEET
FLOW
FORCE
FUEL
GALLON
GAS
GRAM
HERTZ
HIGH
HIGHER
INCHES
INTRUDER
KILO
LIMIT
LOAD
LOCK
LOW
MEASURE
MARK
MEG
MEGA
METER

MICRO
MILE
MILLI
MINUS
MINUTE
NORMAL
OPERATOR
PER
PERCENT
PHASE
POUND
PRESSURE
PULSE
RANGE
SAFE
SMOKE
SPEED
SWITCH
SYSTEM
TEMPERATURE
TEST
VOLT
WARNING
WEIGHT

2 disks $19.95

EDUCATIONAL
EARS SPEECH LIBRARY

AFTER
AMIE
ANSWER
AROUND
AREA
AWAY
BEFORE
BOB
BOX
BOY
CAN
CAT
CHAIR
CHRIS
CLASS
DAY
DECIMAL
DESK
DIFFERENCE
DO
DOG
DRINK
FALL
FIND

FRACTION
GIRL
GIVE
GOOD
HILL
HORSE
HOW
JOHN
LAURA
LIKE
LINDA
LISA
MAKE
MEAGAN
MEASURE
MISSING
MODIFY
NAME
NIGHT
NOUN
PEOPLE
PERIOD
PHRASE
PRODUCT

PUT
QUESTION
RACHAEL
RICHARD
SAY
SENTENCE
SINK
SIT
SIGN
SOLVE
SPELL
SQUARE
SPRING
SUBTRACT
SUMMER
TABLE
TAKE
TEACHER
TIM
TOM
UNDER
VERB
WOULD
WINTER

2 disks $19.95

CUSTOM
EARS SPEECH LIBRARY

For those needing a custom vocabulary, Speech Systems offers customized speech libraries at the rate of $15 per phrase (5 seconds max.), 10 phrases minimum order. Provide an audio cassette tape with phrases or use our announcer. . . . . Minimum $150.00

SAVE $40
BUY 3
GET ALL 5
Introductory Offer†

*EARS and Disk system required.
†Custom Library not part of introductory offer.

SYMPHONY 12™

A 12 VOICE POLYPHONIC STEREO MUSIC SYNTHESIZER

NEW! 61 NOTE KEYBOARD

$20 OFF

musical applications of microprocessors

- 12 SIMULTANEOUS VOICES
- STEREO & MONO
- 4 NOISE GENERATORS
- SOUND EFFECTS
- PLAYS AND MAKES MUSICA 2 FILES

SUPER POLYPHONIC. Speech Systems is proud to bring you SYMPHONY 12, a polyphonic 12 voice hardware stereo music synthesizer for the Color Computer. SYMPHONY 12 also gives you 4 noise generators for percussion synthesis and sound effects. The PIANO KEYBOARD and MUSICA 2 (sold separately) turns your COCO into a real music machine with incredible flexibility.

STEREO and MONO. By connecting SYMPHONY 12 to your home stereo system, music is produced in stereo, 6 voices from each channel. However, you don't need to have a stereo system, all 12 voices also come out of your TV or monitor.

PICK AN INSTRUMENT. SYMPHONY 12 lets you choose from 10 preset instruments to synthesize chimes, violin, oboe, banjo, harpsichord, piano and more. You can even change instruments as the music plays.

SOUND EFFECTS. SYMPHONY 12 is a sophisticated sound generator. 12 voices and 4 noise generators give you incredible sound effect capability. We have included gun shot, explosion, racing car and more.

WATCH IT PLAY. As SYMPHONY 12 plays, a graphics display of a piano keyboard shows the notes playing. The display is entertaining as well as very educational.

PLAY MUSICA 2 FILES. Thousands of MUSICA 2 users will be excited to know SYMPHONY 12 plays all music developed using MUSICA 2 like you have never Seen or Heard it. In fact we highly recommend the use of MUSICA 2 as a composition development tool for SYMPHONY 12. Use MUSICA 2's superior graphics input capability and then play it through SYMPHONY 12. You can also take advantage of our MUSIC LIBRARY series (sold separately) to give you access to over 500 music pieces representing 20 hours of music.

ULTIMATE MUSIC DEVELOPMENT SYSTEM. SYMPHONY 12, MUSICA 2, and the PIANO KEYBOARD give you incredible flexibility. Imagine sitting down at the PIANO KEYBOARD, playing a piece and recording it as you play just as you would to a tape recorder. Save your masterpiece and then using MUSICA 2 edit it if you like and print it. If you have a MIDI synthesizer, you can take the music and play it using COCO MIDI (sold separately). Try that on an IBM, APPLE, or COMMODORE (good luck).

PIANO KEYBOARD. For those wishing to turn SYMPHONY 12 into a real polyphonic synthesizer we offer the extremely powerful and versatile PIANO KEYBOARD. The PIANO KEYBOARD was deisgned to be used in our entire music product line. You can use it with SYMPHONEY 12, MUSICA 2, SYNTHER 77 PLUS, and even our advanced speech synthesizer, SUPER VOICE.

When using MUSICA 2, you will be using 4 of the 12 voices available from SYMPHONY 12. To take advantage of the full 12 voice capability of SYMPHONY 12 you may use either the Color Computer's keyboard or the PIANO KEYBOARD.

Y-CABLE or MULTI-PAK. Tape users using both SYMPHONY 12 and the PIANO KEYBOARD will require a Y-CABLE. Disk users will require the Triple Y-Cable or MULTI-PAK.

SYMPHONY 12. You get over a dozen music and sound effect selections and complete documentation. Software is shipped on Tape or Disk.

SYMPHONY 12	$79.95
SYMPHONY 12 (with Keyboard order)	$59.95
OPTIONS	
MUSIC LIBRARY (each volume)	$29.95
MUSICA 2	$29.95
PIANO KEYBOARD (61 note)	$129.95

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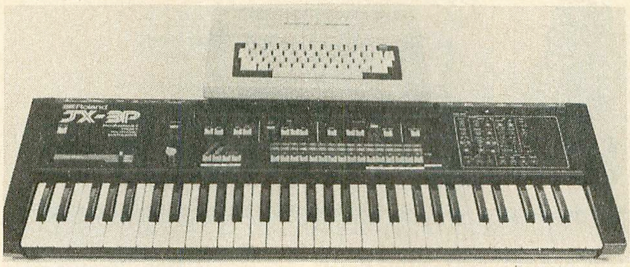
COCO MIDI SEQUENCER/EDITOR

Now your COCO can talk to your MIDI music synthesizer. Whether you have a Korg, Roland, Casio, Yamaha, or Moog, it doesn't matter as long as it's MIDI equipped. Choose from our entry level MUSICA 2 COCO MIDI system that plays MUSICA files or our Professional COCO MIDI SYSTEM.

- Supports up to 16 tracks.
- 2,000 events per track.
- 4,000 events all tracks.
- May be used as a sequencer.
- User friendly graphics display.
- Menu driven.
- Metronome available.
- Real time recording.
- Save your masterpiece to disk.
- Tempo may be modified.
- Quantizing to 32nd or 64th.



- Playback any or all tracks at any tempo.
- Tracks may be deleted, copied, transposed or mixed.
- Filter out unwanted channel or type of MIDI data.
- Simple music editing.
- Requires 64K disk system.
- Transposition.

Comes complete with Rom Pak Hardware interface, cables, manual, and software. Disk users require Y-Cable or Multi-Pak $149.95

Now under development, voicing patch libraries for the Casio CZ series of synthesizers.

CZ-101 USERS!

We offer the CZ-101 CONNECTION and the 61 NOTE PIANO KEYBOARD to turn the 101 into a professional full size synthesizer.

CZ-101 CONNNECTION . $29.95
61 NOTE KEYBOARD . $129.95

MUSICA MIDI™

COCO MIDI takes any MUSICA 2 music file and plays it through your music synthesizer. We offer you over 800 tunes from our MUSIC LIBRARY series (sold separately) or create your own music using the best music composition program available, MUSICA 2 (sold separately).

COCO MIDI includes: documentation, plenty of music, and the cable to connect between the COCO and your synthesizer. . . . . **$39.95** Tape or Disk

MUSIC LIBRARY™

The MUSIC LIBRARY series consists of 8 volumes: 100 through 800 each sold separately. Each contains over 100 four voice music selections with a playing time of over 3 hours each. The disk version is shipped on 5 full disks. When coupled with the STEREO PAK, the music is reproduced with unsurpassed realism.

A JUKEBOX program is included to allow you to select specific songs or automatically play each. These songs are ready to go, you don't need MUSICA 2 or a knowledge of music. MUSICA 2 users may customize each song. Each volume sold separately, specify tape or disk. . . . . **$29.95** Tape or Disk

MUSIC LIBRARY 100

Stage, Screen, & TV
Music of the 70's
Music of the 60's
Music of the 50's
Old Time Favorites
Classical
Christmas (popular)
Christmas (traditional)
Patriotic
Polka Party

MUSIC LIBRARY 200 (another 100 selections)
MUSIC LIBRARY 300 (another 100 selections)
MUSIC LIBRARY 400 (another 100 selections)
MUSIC LIBRARY 500 (another 100 selections)
MUSIC LIBRARY 600 (another 100 selections)
MUSIC LIBRARY 700 (another 100 selections)
MUSIC LIBRARY 800 (another 100 selections)

**Entire Library
30 Hours of
Music!
40 disks
or
25 tapes**

SYNTHER 77 PLUS

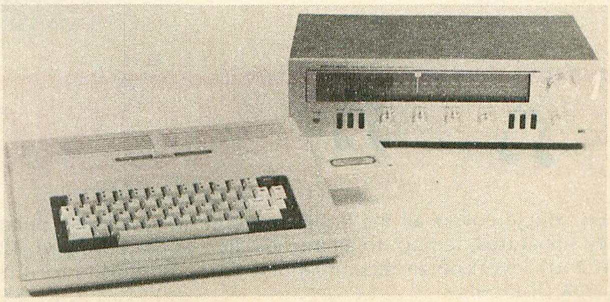
You control vibrato pattern, Bender rate, Volume level as well as Attack, Decay, Sustain, and Release (ADSR envelope). As you play you can record, then edit and save it to disk or tape. You can even fine tune it to match other instruments.

The PIANO KEYBOARD is not necessary, you can use your COCO keyboard but the PIANO KEYBOARD makes your COCO a real music instrument. . . . . . . **$29.95** Disk only

STEREO PAK™

Plug this gem into your computer, connect to your home stereo system and sit back and enjoy music realism. The STEREO PAK is a hardware music synthesizer that plays our MUSIC LIBRARY series and MUSICA 2 music in stereo. Because it was designed specifically with music reproduction in mind, the sound is superb. The highs are crisp and clear while the bass notes will rattle your walls. Internally we use two high performance 8 bit digital to analog converters to assure fidelity.

The STEREO PAK is all hardware. It is intended as an enhancement for MUSICA 2 and our MUSIC LIBRARY series. Disk users will require our Y-CABLE or a MULTI-PAK. **$39.95**



NEW! 61 NOTE PIANO KEYBOARD

ATTENTION CZ-101 OWNERS

The PIANO KEYBOARD and **SYMPHONY 12** turns the COCO into a 12 voice music synthesizer. When used with **MUSICA 2**, the PIANO KEYBOARD provides a user-friendly means of inputting music. For those wishing control over Vibrato, Volume, Bender, as well as Attach, Decay, Sustain, and Release (ADSR), we offer **SYNTHER 77 PLUS**, a monophonic synthesizer. **SUPER VOICE**, COCO's most advanced speech synthesizer, doubles as a music synthesizer when used with the PIANO KEYBOARD. For those with the Casio CZ-101 music synthesizer, the **CZ-101 CONNECTION** allows you to connect the "full size" PIANO KEYBOARD to give you standard keyboard.

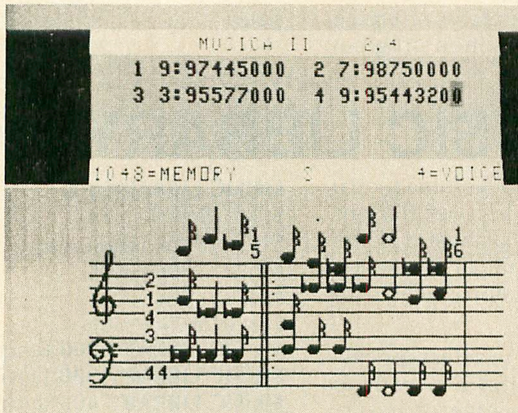
Our new 61 note (5 octave) full size keyboard is perfect for the beginner or professional. To give the PIANO KEYBOARD the most flexibility, we give you a choice of 5 different products to use: **SYMPHONY 12, MUSICA 2, SYNTHER 77 PLUS, SUPER VOICE, and the CZ-101 CONNECTION.**

61 NOTE PIANO KEYBOARD	**$129.95**
CZ-101 CONNECTION	**$ 29.95**

MUSICA 2

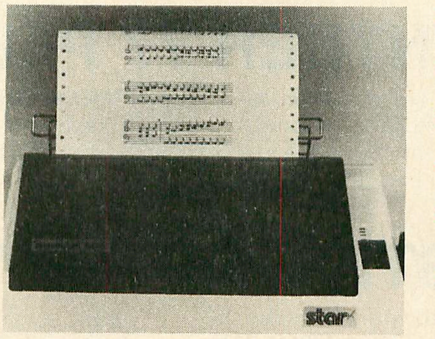
$29.95
Tape or Disk

- When in stereo mode, music is played through our STEREO PAK (purchased separately).
- Loudness of each voice may be individually specified.
- Memory available is constantly displayed.
- Voice waveshapes may be exchanged between voices at any point.
- Tempo may be specified and may even be altered as the music plays.
- Flats and sharps supported.
- Billions of timbre combinations.
- High resolution graphic display, looks just like sheet music.
- MUSICA 2 is 100% software, no need for hardware unless you want music produced in STEREO. In that case, the STEREO PAK may be purchased separately. It's a must for the audiophile!
- Repeat bars allow repeating of music without re-inserting music a second or third time.
- 30 page manual describes all.
- Requires 64K.



```
MUSICA II    2.4
1 9:97445000  2 7:98750000
3 3:95577000  4 9:95443200
1048=MEMORY        3         4=VOICE
```

- Output music to your printer (Gemini 10X, Epson, R.S. printers).



- Allows you to specify key signature.
- Voice timbre (waveshape) may be altered by specifying harmonic content just like stops on an organ.
- During editing, voice being inserted is displayed.
- Each measure is numbered for easy reading of music.
- Measure bars aid in reading and developing music.
- Each voice may be visually highlighted for easy identification.
- 4 Voices produced simultaneously.
- Input notes from Coco keyboard, joystick, or Piano Keyboard.
- Play music from your own BASIC program.
- Block copy music for easy music development.
- 100% machine language so it is lightning fast.
- Vibrato effect easily produced.
- With STEREO PAK, voices may be switched between left and right speakers as music plays.
- Durations include: whole, half, quarter, eighth, sixteenth, thirty-second, sixty-fourth, and triplet.

MUSIC THEORY

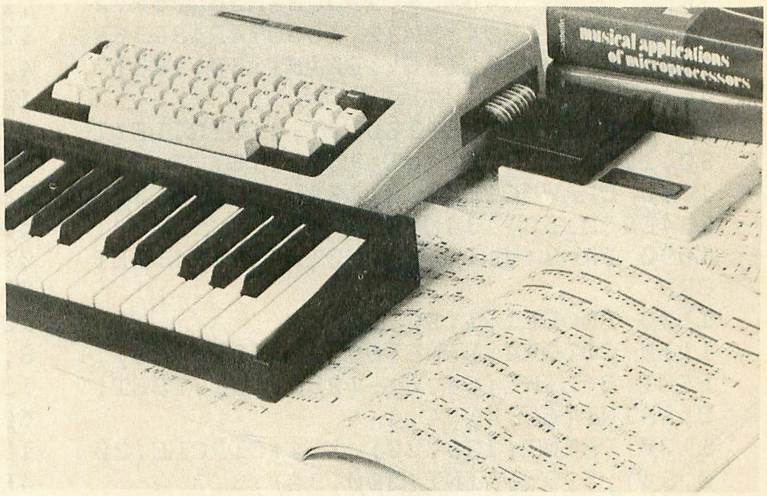
COURSE 1

This course covers all the basics from music notation & duration, key signatures, tempo, to an introduction of the keyboard. This is an entry level course recommended as a prerequisite for Course 2. 32K Disk only **$49.95**

COURSE 2

A more advanced course that deals with: Major and Harmonic Minor scales, interval spelling, Triad (Chord) theory, Inversions, Dominant 7th chords, and ear training of the intervals. 32K Disk only . **$49.95**

'SUPER VOICE' T.M.



COCO'S MOST ADVANCED SPEECH SYNTHESIZER.

IT TALKS, SINGS AND MORE.

only . . . $79.95

WITH EARS PURCHASE

only . . . $59.95

SUPER VOICE is no ordinary speech synthesizer. It uses Silicon Systems, Inc. SSI-263, the most advanced speech/sound chip available. SUPER VOICE is not only capable of highly intelligible speech, sound effects, and singing over a 6 octave range, but now we have turned SUPER VOICE into a monophonic Super Music Synthesizer with our PIANO KEYBOARD.

IT TALKS. A free TRANSLATOR text-to-speech program makes writing your own talking program as easy as SAYING "HELLO."

SUPER VOICE works in any 32K or 64K computer. A disk system requires a Y-Cable or Multi-Pak.

FREE "REACTION" To Test Your Reflexes

FREE SUPER VOICE SINGS THE STAR SPANGLED BANNER

FREE "SIMON" To Test Your Memory

Here are the facts; the decision is yours.

	SUPER VOICE	REAL TALKER	RS SPEECH CARTRIDGE	VOICE-PAK
Synthesizer Device	SSI-263	SC-01	SP-256	SC-01
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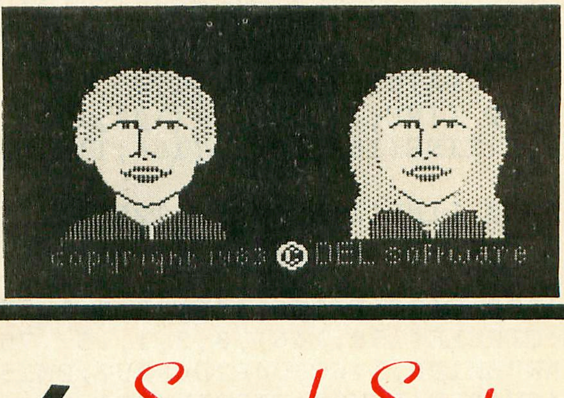

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```
RCLE(130,126),6,3,1,.5,0:CIRCLE(
150,126),6,3,1,.5,0
1050 A$="C3NL4NR4NU2NE2NH2":DRAW
"BM110,126"+A$:DRAW"BM130,126"+A
$:DRAW"BM150,126"+A$
1060 DRAW"C4BM28,190U82R56D36R92
U36R56D82L204;BM32,186U74R48D36R
100U36R48D74L196":PAINT(30,188),
4,4
1070 PAINT(128,180),1,4:CIRCLE(1
30,176),5,3:PAINT(130,176),3,3
1080 DRAW"C1BM110,134D6L24BM130,
134D8BM150,134D6R24
1090 PA=3:V=10:H=RND(52)+104:RET
URN
1100 PMODE1,1:PCLS2
1110 COLOR4:LINE(60,2)-(254,64),
PSET,B:LINE(64,6)-(250,60),PSET,
B:PAINT(62,4),4,4
1120 PAINT(128,20),1,4:CIRCLE(20
0,34),5,3:PAINT(200,34),3,3
1130 COLOR2:LINE(136,8)-(136,58)
,PSET,B:LINE(190,8)-(190,58),PSE
T,B
1140 DRAW"C1BM186,66F4NG4L54"
1150 DRAW"C4BM152,92R102D98L102U
28L92U40R92U30;BM156,96R94D90L94
U28L92U32R92U30":PAINT(154,94),4
,4
1160 PAINT(224,148),1,4:CIRCLE(8
0,148),5,3:PAINT(80,148),3,3
1170 H=70:V=RND(48)+8:PA=4:RETUR
N
1180 PMODE1,1:PCLS2
1190 COLOR4:LINE(32,0)-(232,190)
,PSET,B:LINE(36,4)-(228,186),PSE
T,B:PAINT(34,2),4,4:LINE(88,56)-
(176,164),PSET,B:LINE(84,52)-(18
0,168),PSET,B:PAINT(86,54),4,4
1200 LINE(100,68)-(164,152),PSET
,B:LINE(104,72)-(160,148),PSET,B
:PAINT(102,70),4,4:PAINT(128,24)
,1,4:PAINT(128,96),1,4
1210 LINE(106,104)-(108,112),PSE
T,B:LINE(158,104)-(156,112),PSET
,B
1220 LINE(116,104)-(120,112),PSE
T,BF:LINE(148,104)-(144,112),PSE
T,BF
1230 CIRCLE(106,146),8,3,1,.75,0
:CIRCLE(158,146),8,3,1,.5,.75:DR
AW"BM106,146C3U4R2D4R2U2;BM158,1
46U4L2D4L2U2":CIRCLE(128,28),5,3
:PAINT(128,28),3,3
1240 V=78:H=RND(48)+108:PA=4:RET
URN
1250 PMODE1,1:PCLS2
1260 DRAW"C4BM254,190U120L108D48
R48D72M254,190;BM250,186U112L100
D40R48D72M250,186":PAINT(252,188
),4,4:PAINT(240,180),1,4
1270 LINE(194,104)-(198,120),PSE
T,BF:COLOR2:LINE(200,104)-(248,1
04),PSET:LINE(200,160)-(248,160)
,PSET
1280 CIRCLE(184,104),5,3:PSET(18
4,104,3):CIRCLE(160,84),5,3:PSET
(160,84,3):CIRCLE(160,104),5,3:P
SET(160,104,3)
1290 DRAW"C4BM254,0D60L126D68R48
D62L108U78L36U48R36U72M254,0;BM2
50,4D52L126D76R48D54L100U78L36U4
0R36U64M250,4":PAINT(252,2),4,4:
PAINT(128,30),1,4
1300 CIRCLE(60,88),5,3:PSET(60,8
8,3)
1310 DRAW"C1BM184,120D2L34D4;BM1
60,68U2R46U4;BM144,104L6U14L8
1320 DRAW"C1BM190,166S8L4R2U2L2R
4BU2L4BU2R4U2BU2NL4U2;BH2U4NF2G2
S4
1330 V=176:H=RND(48)+200:PA=4:RE
TURN
1340 PMODE1,1:PCLS1
1350 COLOR4:LINE(30,0)-(254,190)
,PSET,B:LINE(34,4)-(250,186),PSE
T,B:PAINT(32,2),4,4
1360 PAINT(0,0),2,4
1370 FORH=34TO110STEP10:FORV=4TO
110STEP10:W=RND(3)*2
1380 LINE(H+W,V+W)-(H+W+2,V+W+2)
,PSET,BF:LINE(H+W+134,V+W+80)-(H
+W+136,V+W+82),PSET,BF:NEXT:NEXT
1390 LINE(110,6)-(134,30),PSET,B
F:LINE(188,100)-(164,76),PSET,BF
1400 CIRCLE(230,66),5,3:PSET(230
,66,3)
1410 H=44:V=126:PA=4:RETURN
1420 PMODE1,1:PCLS1:COLOR4
1430 LINE(30,0)-(254,190),PSET,B
:LINE(34,4)-(250,186),PSET,B:PAI
NT(32,2),4,4:PAINT(0,0),2,4
1440 LINE(138,54)-(142,190),PSET
,BF:LINE(144,94)-(252,98),PSET,B
F
1450 CIRCLE(85,154),5,3:CIRCLE(2
22,124),5,3:PSET(85,154,3):PSET(
222,124,3)
1460 V=158:FORH=92TO136STEP6:PSE
T(H,V,2):V=V+2:NEXT
1470 DRAW"C3BM248,100L40D4R36D36
R4U40":PAINT(246,102),3,3
1480 COLOR4:LINE(75,54)-(95,74),
PSET,BF:LINE(55,90)-(75,110),PSE
T,BF:LINE(95,90)-(115,110),PSET,
BF
1490 H=RND(30)+210:V=80:PA=6:RET
URN
```

16K
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Design Your Own Calendar Pin-Up

By Hong Kwong

Picture Calendar prints a calendar for 1986 and, with a few modifications, it prints one for any other year. What's different about this program is that it customizes the calendar with any drawing in `PMODE1` or `PMODE3`. It fills about two-thirds of a 9 by 11 page with a graphics screen and then prints the calendar with a picture on top.

The program is intended for the Star Micronics Delta-10 printer, however, it should be directly compatible with most Epson and Gemini printers. It may be altered to work with other manufacturers' printers as well. And, this program does require that the disk drive controller be unplugged from the CoCo.

The operation of the program is fairly simple. To begin, have a `PMODE4` screen saved on cassette. When first running the program it asks if you want to load a new picture from tape or print the current one in memory.

If you just started, choose to load from tape. After doing so, prepare the tape and press ENTER. When the screen is loaded, it returns to the menu. Now it is ready to make a printout. Before choosing Option two, however, make sure the printer is on and the paper is at the top of the page. After selecting Option two, the picture in memory appears on the screen along with a blinking rectangle. The rectangle shows what will be printed on the calendar. Just move the right joystick up and down until the portion of the graphics screen to be printed on the calendar is correct and press ENTER. The program then prints the calendar and returns to the menu.

I find that printing anything drawn in `PMODE3` or `4` tends to be stretched out of proportion because it is only a 128 by 74 printout. But if the drawing is done in `PMODE1`, most of the screen fits on paper and looks much better.

To change the year of the calendar, change the data in Line 850 and Line 860. Line 850 holds the year. The data on Line 860 is set up in pairs, one pair for each month from January to December. The first number of the pair tells the computer what day to start counting from. This number will always be less than or equal to one and it can easily be found by looking at a calendar of the year wanted.

Hong Kwong is attending the University of Michigan at Dearborn. Author of the programs Zookey *from Mark Data Products and* Inatak *from DSL, he is studying electrical engineering.*

For each month, look at what day the *1st falls* on and start counting backwards until you reach Sunday; that'll be the number for that month. For example: The first day of January 1986 falls on Wednesday. Starting with Wednesday = 1, count backwards. Tuesday = 0, Monday = -1 and Sunday = -2. The number for January is -2. The second number of the pair tells how many days are in that month. Change the days for February only if it is a leap year.

If using a printer other than the Delta-10, you may have to change some or all of the printer codes. All of the codes used in this program are located in lines 170 through 250.

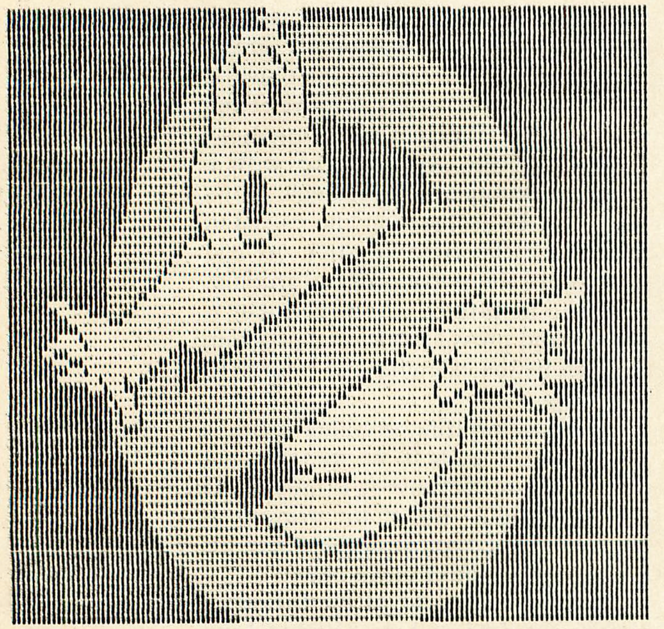
Here is a description of what each code does:

E$	— Escape code
C$	— Set the print pitch to condensed (17 cpi)
L$	— Change line spacing to 7/72 inch
L1$	— Change line spacing to 40/216 inch
In$	— Initialize printer
X1$	— Set printer to expanded print
X0$	— Turn off expanded print
EM$	— Select emphasized printing
U1$	— Turn on underlining
U0$	— Turn off underlining

If any of these codes are different on your printer, just replace the codes in lines 170 through 250 with the correct ones for your printer. ☐

The listing: CALENDAR

```
100 GOTO 910' 2-28-86
110 CLS
120 CLEAR 200,&H7F00
130 PRINT@200,"PICTURE  CALENDAR
"
140 PRINT@266,"BY HONG KWONG"
150 PRINT@480,"ONE MOMENT PLEASE
...";
160 DIM M(12,6,7),M$(12)
170 E$=CHR$(27)
180 C$=CHR$(15)
190 L$=E$+CHR$(49)
195 L1$=E$+CHR$(51)+CHR$(40)
200 IN$=E$+CHR$(64)
210 X1$=E$+CHR$(87)+CHR$(1)
```



```
220 X0$=E$+CHR$(87)+CHR$(0)
230 EM$=E$+CHR$(69)
240 U1$=E$+CHR$(45)+CHR$(1)
250 U0$=E$+CHR$(45)+CHR$(0)
260 TA=3:P=-2
270 POKE 150,1
280 READ Y$
290 FOR M=1 TO 12
300 READ DD,N
310 FOR W=1 TO 6:FOR D=1 TO 7
320 M(M,W,D)=DD
330 DD=DD+1
340 IF DD>N THEN DD=-20
350 NEXT D,W:NEXT M
360 FOR X=1 TO 12
370 READ M$(X)
380 NEXT
390 IF PEEK(&H7F53)=18 THEN 430
400 FOR T=&H7F53 TO &H7FD0
410 READ A:POKE T,A:Q=Q+A
420 NEXT T
430 IF Q<>12778 THEN PRINT"DATA
ERROR!!!"
440 CLS
450 PRINT:INPUT"1=CLOAD,2=PRINT
CURRENT PICTURE";L
460 IF L=1 THEN GOSUB 730
470 IF L=2 THEN GOSUB740:GOTO490
480 GOTO 440
490 PRINT#P,C$;L$;
500 GOSUB 760
510 PRINT#P:PRINT#P
520 PRINT#P,IN$;X1$;EM$;  TAB(25
) Y$ ;X0$;C$;L1$
530 FOR X=1 TO 12 STEP 6
540 PRINT#P,"    " U1$; STRING$(1
33,32)  U0$
550 PRINT#P,TAB(3)"!" U1$;:FOR Y
=X TO X+5
560 PRINT#P,"              "M$(Y)"
!";
570 NEXT Y:PRINT#P,U0$
580 A$="S  M  T  W  T  F  S!"
590 PRINT#P,TAB(3) "!";U1$;"  "
A$"  "A$"  "A$"  "A$"  "A$"  "A$
```

```
; U0$
600 FOR W=1 TO 6
610 PRINT#P,TAB(TA) "!";
620 FOR M=X TO X+5
630 FOR D=1 TO 7
640 MM=M(M,W,D)
650 IF MM<1 THEN PRINT #P,"   ";
:GOTO 670
660 PRINT#P,USING"###";MM;
670 NEXT D:PRINT#P,"!";
680 NEXT M:PRINT#P,U0$
690 IF W=5 THEN TA=0:PRINT#P,"
 "U1$; ELSE TA=3
700 NEXT W
710 NEXT X
720 GOTO 440
730 CLS:INPUT"CASS READY";A:PMOD
E4,1:SCREEN1,1:CLOADM
740 PMODE4,1:SCREEN1,1:PCOPY1TO5
:PCOPY2TO6:PCOPY3TO7:PCOPY4TO8
750 RETURN
760 PMODE3,1:SCREEN1,0
770 X=JOYSTK(0):Y=JOYSTK(1)*2
780 LINE (0,Y)-(255,Y+73),PSET,B
790 PCOPY5TO1:PCOPY6TO2:PCOPY7TO
3:PCOPY8TO4
800 IF INKEY$<>CHR$(13) THEN 770
810 POKE &H7F50,Y
820 PRINT#P,C$;
830 EXEC &H7F53
840 RETURN
850 DATA 1986
860 DATA -2,31,-5,28,-5,31,-1,30
,-3,31,1,30,-1,31,-4,31,0,30,-2,
31,-5,30,0,31
870 DATA "  JANUARY"," FEBRUARY"
,"    MARCH","     APRIL","
MAY","      JUNE","      JULY","
 AUGUST","SEPTEMBER","  OCTOBER"
," NOVEMBER"," DECEMBER"
880 DATA 18,18,18,18,134,254,151
,111,18,18,18,18,18,18,182,127,8
0,198,32,61,142,6,0,48,139,134,7
4,183,127,81,134,32,183,127,82,1
34,32,173,159,160,2,173,159
890 DATA 160,2,173,159,160,2,173
,159,160,2,173,159,160,2,173,159
900 DATA 160,2,230,132,84,84,84,
84,84,84,141,20,230,132,84,84,84
,84,141,12,230,132,84,84,141,6,2
30,128,141,2,32,13,196,3,16,142,
127,204,166,165,173,159,160,2,57
,122,127,82,38,208,134,13,173,15
9,160,2,122,127,81,38,166,57,35,
42,43,46,0
910 PCLEAR8:GOTO 110
```

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13
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Baseball Card File

By James W. Wood

Do you have wall-to-wall baseball or football cards? Wish there were a better way to organize teams or players than to have them occupy an entire living room floor? If so, then *Baseball Card File* is designed for you. It creates a random access file for storage of baseball cards. The program's options include the ability to add cards to a file, examine for all occurrences of a player, examine for all occurrences of a team, editing of a card and printing of all cards in a file.

When running the program, enter a name for the file. Use any eight digit (or less) combination that starts with a letter. Perhaps *BASEBALL*, *BBA LL85*, or *CUBS* (if the file is to contain only one team). A disk that contains only files should be able to store the information for 3,000 baseball cards. The program itself can be saved on a separate disk. Make sure a formatted disk is in place when running the program. The information that is stored includes the card's player, team, the year as a two-digit number, manufacturer of card and how many of that card you possess.

When examining by player, the program asks for a name and displays all occurrences of that player. The same goes for examination by team. The

---

James Wood is in his fifteenth year of teaching at Atwood Hammond High School in Atwood, Illinois. His subjects include photography, physics, chemistry, computer programming and math courses. He holds master's degrees in both instructional media and physical science education.

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EDIT function is helpful for correcting any mistakes made or for changing the number of a card owned.

I did not include a delete mode because I thought no one would want to trade the last of any one card. However, deletion can be accomplished by editing a card and changing it to another player.

When adding cards, first examine by player. If that card is already entered, use EDIT to change the quantity. If you don't have that card, use ADD A CARD. If you enjoy this program, you can buy me some peanuts and Cracker Jacks! □

The listing: BASEBALL

```
5 REM JAMES W. WOOD, 424 N. MISS
OURI, ATWOOD, IL, 61913
10 REM BASEBALL CARD FILE
15 CLS:INPUT"NAME OF DISK FILE";
JW$:JW$=JW$+"/DAT"
20 CLS:PRINT
30 PRINT"ADD A CARD         (1).
"
40 PRINT"EXAMINE BY PLAYER  (2).
"
50 PRINT"EXAMINE BY TEAM    (3).
"
60 PRINT"EDIT A CARD        (4).
"
70 PRINT"PRINT ALL FILES    (5).
"
75 PRINT"CHANGE DISK FILE   (6).
80 PRINT:PRINT"TYPE A NUMBER (1-
6)."
90 A$=INKEY$
100 B$=INKEY$:IFB$=""THEN100
110 IF VAL(B$)<1 OR VAL(B$)>6 TH
EN 100
120 ON VAL(B$) GOTO 130,230,350,
470,860,15
130 CLS:INPUT"PLAYER'S NAME";N$:
IF N$=""THEN 130
140 INPUT"PLAYER'S TEAM";T$:IF T
$="" THEN 140
150 INPUT"YEAR OF CARD";Y$:IF Y$
="" THEN 150
160 INPUT"COMPANY OF CARD";C$:IF
 C$=""THEN 160
170 PRINT"HOW MANY OF THIS CARD,
":INPUT"NUMBER LESS THEN 99";M$:
IF LEN(M$)>2 OR M$="" THEN 170
180 GOSUB950
190 R=LOF(1)+1
200 GOSUB1000
210 PUT #1,R:CLOSE#1
220 GOTO20
230 CLS:PRINT:INPUT"NAME OF PLAY
ER";N$:IF N$=""THEN 230
240 INPUT"TO PRINTER (Y/N)";P$:I
F P$="" THEN 240 ELSE P$=LEFT$(P
$,1)
250 IF LEN(N$)>25 THEN N$=LEFT$(
N$,25) ELSE N$=N$+STRING$(25-LEN
(N$),32)
260 GOSUB950
270 FOR R=1 TO LOF(1)
280 GET #1,R
290 IF N1$=N$ THEN GOSUB980:IF P
$<>"Y" THEN FORT=1TO300:NEXTT EL
SE GOSUB 1030
300 NEXT R
310 CLOSE#1
320 PRINT:PRINT" PRESS (ENTER) F
OR MENU"
330 A$=INKEY$:IFA$=""THEN330 ELS
E IFASC(A$)<>13 THEN 330
340 GOTO20
350 CLS:PRINT:INPUT"NAME OF TEAM
";T$:IF T$=""THEN 350
360 INPUT"TO PRINTER (Y/N)";P$:
IF P$="" THEN360 ELSE P$=LEFT$(P
$,1)
370 IF LEN(T$)>12 THEN T$=LEFT$(
T$,12) ELSE T$=T$+STRING$(12-LEN
(T$),32)
380 GOSUB950
390 FOR R=1 TO LOF(1)
400 GET #1,R
410 IF T1$=T$ THEN GOSUB 980:IF
P$<>"Y" THEN FORT=1TO300:NEXTT E
LSE GOSUB 1030
420 NEXTR
430 CLOSE#1
440 PRINT:PRINT"PRESS (ENTER) FO
R MENU"
450 A$=INKEY$:IFA$=""THEN450 ELS
E IF ASC(A$)<>13 THEN 450
460 GOTO20
470 CLS:PRINT"EDIT A CARD":PRINT
480 PRINT"NAME OF PLAYER.":INPUT
 N$:IF N$="" THEN 480
490 PRINT"NAME OF TEAM.":INPUT T
$:IF T$="" THEN 490
500 PRINT"YEAR (2 DIGITS).":INPU
T Y$:IF Y$="" THEN 500
510 PRINT"CARD COMPANY.":INPUT C
$:IF C$="" THEN 510
520 IF LEN(N$)>25 THEN N$=LEFT$(
N$,25) ELSE N$=N$+STRING$(25-LEN
(N$),32)
530 IF LEN(T$)>12 THEN T$=LEFT$(
T$,12) ELSE T$=T$+STRING$(12-LEN
(T$),32)
540 IF LEN(C$)>8 THEN C$=LEFT$(C
$,8) ELSE C$=C$+STRING$(8-LEN(C$
),32)
550 GOSUB950
560 FF=0
570 FOR R=1 TO LOF(1)
```

```
580 GET#1,R
590 IF N1$=N$ AND T1$=T$ AND Y1$
=Y$ AND C1$=C$ THEN CLS:GOSUB980
:FF=1:CLOSE#1:GOTO 630
600 NEXT R
610 IF FF=0 THEN PRINT:PRINT"NOT
 FOUND"
620 GOTO 820
630 'FOUND ONE
640 PRINT:INPUT"CHANGE NAME (Y/N
)";Q$:IF Q$=""THEN 640
650 IF LEFT$(Q$,1)<>"Y" THEN N$=
N1$:GOTO670
660 INPUT"CORRECT NAME";N$:IF N$
="" THEN 660
670 INPUT"CHANGE TEAM (Y/N)";Q$:
IF Q$=""THEN670
680 IF LEFT$(Q$,1)<>"Y" THEN T$=
T1$:GOTO700
690 INPUT"CORRECT TEAM";T$:IF T$
="" THEN 690
700 INPUT"CHANGE YEAR (Y/N)";Q$
710 IF LEFT$(Q$,1)<>"Y" THEN Y$=
Y1$:GOTO730
720 INPUT"CORRECT YEAR";Y$:IF Y$
=""THEN 720
730 INPUT"CHANGE COMPANY (Y/N)";
Q$:IF Q$="" THEN 730
740 IF LEFT$(Q$,1)<>"Y" THEN C$=
C1$:GOTO760
750 INPUT"CORRECT COMPANY";C$:IF
 C$="" THEN 750
760 INPUT"CHANGE QUANITY (Y/N)";
Q$:IF Q$="" THEN 760
770 IF LEFT$(Q$,1)<>"Y" THEN Y$=
Y1$:GOTO790
780 INPUT"CORRECT QUANITY (LESS
THEN 99)";M$:IF M$="" OR LEN(M$)
>2 THEN 780
790 GOSUB950
800 GOSUB1000
810 PUT#1,R
820 CLOSE#1
830 PRINT"PRESS (ENTER) FOR MENU
."
840 A$=INKEY$:IFA$=""THEN840 ELS
EIF ASC(A$)<>13 THEN 840
850 GOTO20
860 CLS
870 GOSUB950
880 FOR R=1 TO LOF(1)
890 GET #1,R
900 GOSUB1030
910 NEXT R
920 CLOSE#1
930 GOTO20
940 END
950 OPEN "D",#1,JW$
960 FIELD #1,25 AS N1$,12 AS T1$
,2 AS Y1$,8 AS C1$,2 AS M1$
970 RETURN
980 PRINT:PRINT"NAME        ";N1$:
PRINT"TEAM        ";T1$:PRINT"YEAR
        ";Y1$:PRINT"COMPANY     ";C1
$:PRINT"QUANTITY    ";M1$
990 RETURN
1000 LSET N1$=N$:LSET T1$=T$
1010 LSET Y1$=Y$:LSET C1$=C$
1020 LSET M1$=M$:RETURN
1030 PRINT#-2,N1$;T1$;Y1$;" ";C1
$;M1$
1040 RETURN
```

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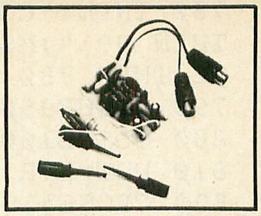

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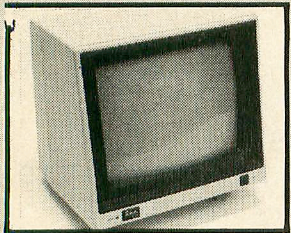

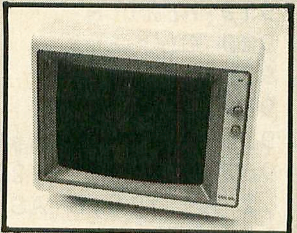

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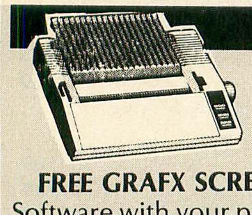

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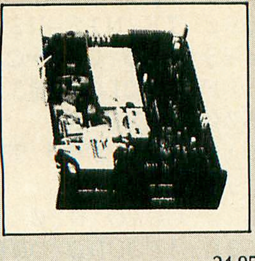

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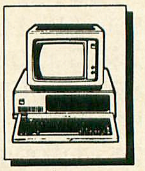

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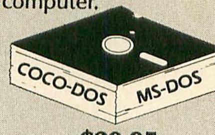

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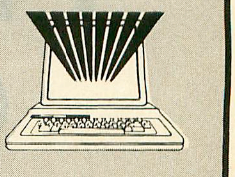

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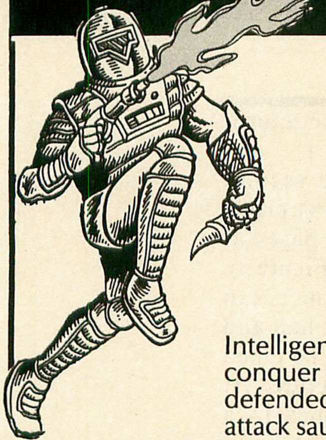

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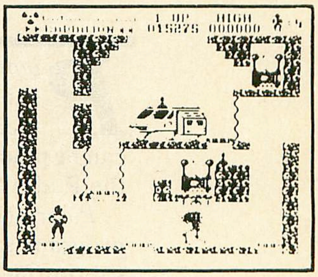

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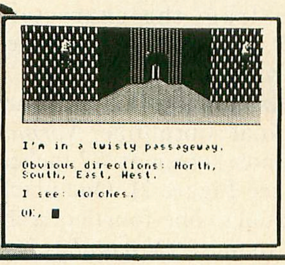

```
I'm in a twisty passageway.
Obvious directions: North,
South, East, West.
I see: torches.
OK: ■
```

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Picprt: Good Things Come in *All* Sizes

By Mark Sullins

Picprt and its machine language subroutines print out graphics pictures, charts or graphs (which can be placed on the graphics screen) on the Radio Shack DMP printers.

Picprt (Listing 1) is a short BASIC program to call the machine language subroutines, handle any necessary manipulations with the original graphics picture and set the printer Baud rate. The machine language subroutines are all loaded in under the name of *PRT/BIN*.

Reduce (Listing 2) is the first subroutine's source code. *Reduce* prints the contents of graphics pages one through four at 2.5 inches by 2.7 inches (see Figure 1). At this size, one pixel (PMODE 4) corresponds to one dot on the printer. ForY, ForX and ForY2 are like FOR/NEXT loops in BASIC, ForYY = 0 to 196 step 7, ForXX = 0 to 255 and ForYY2 = 0 to 7, respectively. This is to test pixels in the order necessary for printing. PPOINT through SET are the lines that perform the equivalent of a PPOINT statement in BASIC. Line 700 does the actual printing. Lines 860-1060 reset the printer and the variables before returning to BASIC.

Enlarge (Listing 3) is the second subroutine's source code. *Enlarge* prints the contents of the graphics pages at 30.8 inches by 31.6 inches (see Figure 3). Since this is wider than the printers can print, it prints out first the left half and then the right half, which can be taped together for the complete picture. At this size, one pixel corresponds to a block the size of one character on the printer. *Enlarge* tests each pixel (one bit) from left to right and from top to bottom, as this is the form in which it is printed. Pnt is the section of the program that informs the user the printer must be aligned to the top of a new page. Lines 350-420 test the pixels and lines 430-480 print either a block or a space from the character table, CHRTB. Finish to 970 resets the printer and the variables.

Normal (Listing 4) is the source code for the final subroutine. *Normal* prints the graphics screen at 7.7 inches by 7.9 inches (see Figure 2). One pixel in this size is equal to one-fourth of a character on the printer. *Normal* tests pixels similar to *Enlarge* but tests two rows and two columns at a time. Lines 350-460 test pixels. Lines 490-600 use a little Boolean algebra to determine the appropriate character to print from the

---

Mark Sullins is a biology research assistant at Kansas State University and has been using his Color Computer for his wife's business records and for fun for over three years.

character table, CHRTB. Lines 610-660 get the character from the table and print it. Lines 920-1080 reset the printer and variables.

All three subroutines must be combined into a single binary file by typing the following with the three subroutines (assembled) on the disk in Drive 0:

```
LOADM "REDUCE/BIN"
LOADM "NORMAL/BIN"
LOADM "ENLARGE/BIN"
SAVEM "PRT/BIN",&H7900,
   &H7E0A,&H7900
```

Now you are ready to print out your favorite graphics picture by running *Picprt* and following the instructions on the screen.

(Questions concerning this program may be directed to the author at 138 Redbud Estates, Manhatten, KS 66502, phone 913-532-6626. Please include an SASE when writing.) ☐

Listing 1: PICPRT

```
5 PCLEAR 8
10 CLS:PRINT "PRESS A KEY WHEN p
rt.bin IS     READY TO LOAD FROM
 DRIVE 0"
20 R$=INKEY$:IF R$="" THEN 20
25 CLS:PRINT "LOADING..."
30 CLEAR 200,&H78FF:LOADM "PRT"
35 DEFUSR0=&H7900:DEFUSR1=&H7D00
:DEFUSR2=&H7B00
37 CLS(3):PRINT"WHAT BAUD RATE I
S YOUR PRINTER  SET FOR?";:PRINT
@128,"[1] 600 BAUD";:PRINT@224,"
[2] 2400 BAUD";
38 R$=INKEY$:IF R$="1" THEN POKE
 150,87 ELSE IF R$="2" THEN POKE
 150,18 ELSE 38
40 CLS(6):PRINT@224,"IS YOUR PIC
TURE ALREADY ON THE  FIRST FOUR
GRAPHICS PAGES [Y/N]";
50 R$=INKEY$:IF NOT(R$="Y" OR R$
="N" OR R$="y" OR R$="n") THEN 5
0
60 IF R$="Y" OR R$="y" THEN 500
70 CLS(8):PRINT@224,"SHOULD I mO
VE PAGES 5-8 TO 1-4  OR SHOULD
I lOAD A PICTURE FROMDISK? [M/L]
"
80 R$=INKEY$:IF R$="L" OR R$="l"
 THEN 100 ELSE IF NOT(R$="M" OR
R$="m") THEN 80
90 CLS(0):PRINT@224,"MOVING...":
FOR I=1 TO 460:NEXT I:PCOPY 5 TO
```

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```
 1:PCOPY 6 TO 2:PCOPY 7 TO 3:PCO
PY 8 TO 4:GOTO 40
100 CLS(7):PRINT@224,"";:LINE IN
PUT "FILENAME TO LOAD THE GRAPHI
CS   SCREEN WITH YOUR PICTURE. I
T    MUST BE IN MACHINE LANGUAGE
     FORMAT ";F$
105 CLS(RND(9)-1)
110 PRINT@224,"LOADING THE PICTU
RE ":PRINT F$
120 LOADM F$:GOTO 40
500 CLS(4):PRINT@6,"PICTURE SIZE
 DESIRED";
510 PRINT@96,"sMALL (2.5 INCHES
X 2.7 INCHES)";
520 PRINT@192,"nORMAL (7.7 INCHE
S X 7.9 INCHES)";
530 PRINT@288,"pOSTER (30.8 INCH
ES X 31.6 IN.) ";
540 PRINT@395,"S, N, OR P";
550 R$=INKEY$:IF R$="S" OR R$="s
" THEN 1000 ELSE IF R$="N" OR R$
="n" THEN 2000 ELSE IF R$="P" OR
 R$="p" THEN 3000 ELSE 550
700 CLS(4):PRINT"DO YOU WISH TO
PRINT ANOTHER    COPY OR ANOTHER
 PICTURE? [Y/N]"
710 R$=INKEY$:IF R$="Y" OR R$="y
" THEN 40 ELSE IF R$="N" OR R$="
n" THEN CLS(RND(9)-1):END ELSE 7
10
1000 CLS(2):PRINT@10,"PRINT PICT
URE";:PRINT@96,"lEFT SIDE OF PAG
E";:PRINT@192,"cENTERED";:PRINT@
288,"rIGHT SIDE OF PAGE";
1010 PRINT@395,"L, C, OR R";
1020 R$=INKEY$:IF R$="L" OR R$="
l" THEN S=0 ELSE IF R$="C" OR R$
="c" THEN S=1 ELSE IF R$="R" OR
R$="r" THEN S=2 ELSE 1020
1030 PMODE 4,1:SCREEN 1,1:A=USR0
(S):POKE &H6F,0:GOTO 700
2000 PMODE 4,1:SCREEN 1,1:A=USR1
(0):POKE &H6F,0:GOTO 700
3000 CLS(2):PRINT"THIS SIZE WILL
 TAKE FOUR PAGES  OF PAPER. YOU
WILL BE ASKED TO  LINE UP THE TO
P OF PAGES 1 AND 3IS THIS WHAT Y
OU WANT [Y/N]?"
3010 R$=INKEY$:IF R$="Y" OR R$="
y" THEN 3020 ELSE IF R$="N" OR R
$="n" THEN 700 ELSE 3010
3020 A=USR2(0):POKE &H6F,0:GOTO
700
```

Listing 2: REDUCE

```
                00100          TITLE  REDUCE
7900            00110          ORG    $7900
7900 7E   7905  00120 BEGIN    JMP    START
7903      0180  00130          FDB    DONE-BEGIN
7905 86   FE    00140 START    LDA    #-2
7907 97   6F    00150          STA    $6F
7909 86   1B    00160          LDA    #27
790B AD   9F A002 00170        JSR    [$A002]
790F 86   14    00180          LDA    #20
7911 AD   9F A002 00190        JSR    [$A002]
7915 86   12    00200          LDA    #18
7917 AD   9F A002 00210        JSR    [$A002]
791B BD   B3ED  00220          JSR    $B3ED
791E F7   7A7F  00230          STB    PPOS
7921 12         00240 FORY     NOP
7922 86   1B    00250          LDA    #27
7924 AD   9F A002 00260        JSR    [$A002]
7928 86   10    00270          LDA    #16
792A AD   9F A002 00280        JSR    [$A002]
792E B6   7A7F  00290          LDA    PPOS
7931 AD   9F A002 00300        JSR    [$A002]
7935 4F         00310          CLRA
7936 AD   9F A002 00320        JSR    [$A002]
793A 12         00330 FORX     NOP
793B 86   80    00340          LDA    #128
793D B7   7A6A  00350          STA    CC1
7940 12         00360 FORY2    NOP
7941 B6   7A6B  00370          LDA    YY
7944 BB   7A6C  00380          ADDA   YY2
7947 81   C0    00390          CMPA   #192
7949 27   31    00400          BEQ    NO70
794B 81   C1    00410          CMPA   #193
794D 27   2D    00420          BEQ    NO70
794F 81   C2    00430          CMPA   #194
7951 27   29    00440          BEQ    NO70
7953 81   C3    00450          CMPA   #195
7955 27   25    00460          BEQ    NO70
7957 81   C4    00470          CMPA   #196
7959 27   21    00480          BEQ    NO70
795B B7   7A6D  00490          STA    PY
795E B6   7A6E  00500          LDA    XX
7961 B7   7A6F  00510          STA    PX
7964 17   008F  00520          LBSR   PPOINT
7967 B6   7A70  00530          LDA    PP
796A 4D         00540          TSTA
796B 27   0F    00550          BEQ    NO70
796D 8E   7A71  00560          LDX    #BITTAB
7970 F6   7A6C  00570          LDB    YY2
7973 3A         00580          ABX
7974 A6   84    00590          LDA    ,X
7976 BB   7A6A  00600          ADDA   CC1
7979 B7   7A6A  00610          STA    CC1
797C B6   7A6C  00620 NO70     LDA    YY2
797F 4C         00630          INCA
7980 B7   7A6C  00640          STA    YY2
7983 81   07    00650          CMPA   #7
7985 26   B9    00660          BNE    FORY2
7987 4F         00670          CLRA
7988 B7   7A6C  00680          STA    YY2
798B B6   7A6A  00690          LDA    CC1
798E AD   9F A002 00700        JSR    [$A002]
7992 B6   7A6E  00710          LDA    XX
7995 81   FF    00720          CMPA   #255
7997 27   09    00730          BEQ    NO90
7999 B6   7A6E  00740          LDA    XX
```

```
799C 4C             00750        INCA
799D B7   7A6E      00760        STA     XX
79A0 20   98        00770        BRA     FORX
79A2 7F   7A6E      00780 NO90   CLR     XX
79A5 86   0A        00790        LDA     #10
79A7 AD   9F A002   00800        JSR     [$A002]
79AB B6   7A6B      00810        LDA     YY
79AE 8B   07        00820        ADDA    #7
79B0 B7   7A6B      00830        STA     YY
79B3 81   C4        00840        CMPA    #196
79B5 1026 FF68      00850        LBNE    FORY
79B9 86   1E        00860        LDA     #30
79BB AD   9F A002   00870        JSR     [$A002]
79BF 86   1B        00880        LDA     #27
79C1 AD   9F A002   00890        JSR     [$A002]
79C5 86   13        00900        LDA     #19
79C7 AD   9F A002   00910        JSR     [$A002]
79CB 7F   7A6A      00920        CLR     CC1
79CE 7F   7A6B      00930        CLR     YY
79D1 7F   7A6C      00940        CLR     YY2
79D4 7F   7A6D      00950        CLR     PY
79D7 7F   7A6E      00960        CLR     XX
79DA 7F   7A6F      00970        CLR     PX
79DD 7F   7A70      00980        CLR     PP
79E0 7F   7A78      00990        CLR     BYT
79E3 7F   7A7A      01000        CLR     NEAR
79E6 7F   7A7B      01010        CLR     BITNO
79E9 7F   7A7C      01020        CLR     TEMP
79EC 7F   7A7D      01030        CLR     CT8S
79EF 7F   7A7E      01040        CLR     MINUS
79F2 7F   7A7F      01050        CLR     PPOS
79F5 39             01060        RTS
79F6 8E   0E00      01070 PPOINT LDX     #3584
79F9 B6   7A6D      01080        LDA     PY
79FC 4D             01090 TEST   TSTA
79FD 27   06        01100        BEQ     STORE
79FF 30   88 20     01110        LEAX    32,X
7A02 4A             01120        DECA
7A03 20   F7        01130        BRA     TEST
7A05 BF   7A78      01140 STORE  STX     BYT
7A08 4F             01150        CLRA
7A09 5F             01160        CLRB
7A0A F7   7A7D      01170        STB     CT8S
7A0D B1   7A6F      01180 LOOP1  CMPA    PX
7A10 27   10        01190        BEQ     FOUND
7A12 5C             01200        INCB
7A13 4C             01210        INCA
7A14 C1   08        01220        CMPB    #8
7A16 26   F5        01230        BNE     LOOP1
7A18 F6   7A7D      01240        LDB     CT8S
7A1B 5C             01250        INCB
7A1C F7   7A7D      01260        STB     CT8S
7A1F 5F             01270        CLRB
7A20 20   EB        01280        BRA     LOOP1
7A22 F7   7A7E      01290 FOUND  STB     MINUS
7A25 4D             01300        TSTA
7A26 27   06        01310        BEQ     F2
7A28 B0   7A7E      01320        SUBA    MINUS
7A2B F6   7A7D      01330        LDB     CT8S
7A2E BE   7A78      01340 F2     LDX     BYT
7A31 B7   7A7A      01350        STA     NEAR
7A34 5D             01360 LOOP2  TSTB
7A35 27   05        01370        BEQ     STAGN
7A37 30   01        01380        LEAX    1,X
7A39 5A             01390        DECB
7A3A 20   F8        01400        BRA     LOOP2
7A3C BF   7A78      01410 STAGN  STX     BYT
7A3F B6   7A6F      01420        LDA     PX
7A42 B0   7A7A      01430        SUBA    NEAR
7A45 B7   7A7B      01440        STA     BITNO
7A48 F6   7A7B      01450        LDB     BITNO
7A4B BE   7A78      01460        LDX     BYT
7A4E A6   84        01470        LDA     ,X
7A50 B7   7A7C      01480 LOOP3  STA     TEMP
7A53 5D             01490        TSTB
```

```
7A54 27   04        01500        BEQ     READY
7A56 49             01510        ROLA
7A57 5A             01520        DECB
7A58 20   F6        01530        BRA     LOOP3
7A5A B6   7A7C      01540 READY  LDA     TEMP
7A5D 49             01550        ROLA
7A5E 24   04        01560        BCC     SET
7A60 7F   7A70      01570        CLR     PP
7A63 39             01580        RTS
7A64 86   01        01590 SET    LDA     #1
7A66 B7   7A70      01600        STA     PP
7A69 39             01610        RTS
7A6A      00        01620 CC1    FCB     0
7A6B      00        01630 YY     FCB     0
7A6C      00        01640 YY2    FCB     0
7A6D      00        01650 PY     FCB     0
7A6E      00        01660 XX     FCB     0
7A6F      00        01670 PX     FCB     0
7A70      00        01680 PP     FCB     0
7A71      01        01690 BITTAB FCB     1
7A72      02        01700        FCB     2
7A73      04        01710        FCB     4
7A74      08        01720        FCB     8
7A75      10        01730        FCB     16
7A76      20        01740        FCB     32
7A77      40        01750        FCB     64
7A78      0000      01760 BYT    FDB     0
7A7A      00        01770 NEAR   FCB     0
7A7B      00        01780 BITNO  FCB     0
7A7C      00        01790 TEMP   FCB     0
7A7D      00        01800 CT8S   FCB     0
7A7E      00        01810 MINUS  FCB     0
7A7F      00        01820 PPOS   FCB     0
          7A80      01830 DONE   EQU     *
          0000      01840        END

00000 TOTAL ERRORS
```

Listing 3: ENLARGE

```
                    00100        TITLE   ENLARGE
7B00                00110        ORG     $7B00
7B00 7E   7B05      00120 BEGIN  JMP     START
7B03      014B      00130        FDB     DONE-BEGIN
7B05 86   99        00140 START  LDA     #153
7B07 17   00CE      00150        LBSR    PNT
7B0A 8E   0E00      00160        LDX     #3584
7B0D 31   88 10     00170 GO     LEAY    16,X
7B10 10BF 7C49      00180        STY     ROWCMP
7B14 86   FE        00190        LDA     #-2
7B16 97   6F        00200        STA     $6F
7B18 86   1B        00210        LDA     #27
7B1A AD   9F A002   00220        JSR     [$A002]
7B1E 86   14        00230        LDA     #20
7B20 AD   9F A002   00240        JSR     [$A002]
7B24 86   1B        00250        LDA     #27
7B26 AD   9F A002   00260        JSR     [$A002]
7B2A 86   1C        00270        LDA     #28
7B2C AD   9F A002   00280        JSR     [$A002]
7B30 86   08        00290 INIT   LDA     #8
7B32 B7   7C02      00300        STA     COUNT
7B35 A6   84        00310        LDA     ,X
7B37 30   88 20     00320        LEAX    32,X
7B3A E6   84        00330        LDB     ,X
7B3C 30   88 E0     00340        LEAX    -32,X
7B3F 49             00350 LOOP1  ROLA
7B40 25   03        00360        BCS     NO1
7B42 7F   7C43      00370        CLR     UL
7B45 34   06        00380 NO1    PSHS    D
7B47 4F             00390        CLRA
7B48 7D   7C43      00400        TST     UL
7B4B 26   02        00410        BNE     NXT1
7B4D 86   01        00420        LDA     #1
```

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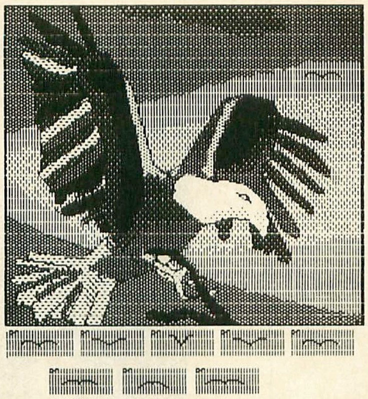

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$10.00 Shipping
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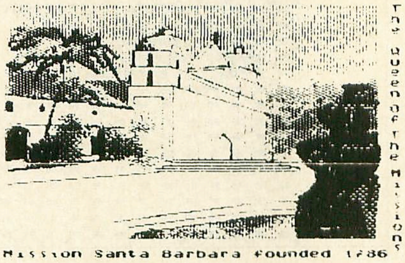

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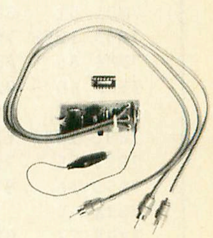

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Mono II for Color Computer 2. An excellent monochrome monitor driver that has audio output also. Specify model needed.

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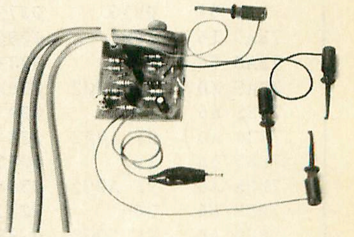
DOUBLE DRIVER II



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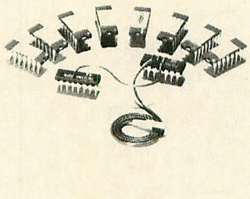

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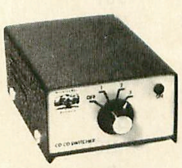

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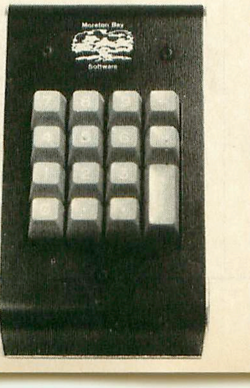

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```
7B4F 1F     89        00430 NXT1     TFR     A,B
7B51 34     10        00440          PSHS    X
7B53 8E     7C47      00450          LDX     #CHRTB
7B56 3A               00460          ABX
7B57 A6     84        00470          LDA     ,X
7B59 AD     9F A002   00480          JSR     [$A002]
7B5D 35     10        00490          PULS    X
7B5F 86     01        00500          LDA     #1
7B61 B7     7C43      00510          STA     UL
7B64 B6     7C02      00520          LDA     COUNT
7B67 80     01        00530          SUBA    #1
7B69 4D               00540          TSTA
7B6A 27     07        00550          BEQ     NXTBYT
7B6C B7     7C02      00560          STA     COUNT
7B6F 35     06        00570          PULS    D
7B71 20     CC        00580          BRA     LOOP1
7B73 35     06        00590 NXTBYT   PULS    D
7B75 30     01        00600          LEAX    1,X
7B77 BC     7C49      00610          CMPX    ROWCMP
7B7A 27     02        00620          BEQ     NXTROW
7B7C 20     B2        00630          BRA     INIT
7B7E 30     88 10     00640 NXTROW   LEAX    16,X
7B81 31     88 10     00650          LEAY    16,X
7B84 10BF   7C49      00660          STY     ROWCMP
7B88 86     0D        00670          LDA     #13
7B8A AD     9F A002   00680          JSR     [$A002]
7B8E 8C     25FF      00690          CMPX    #9727
7B91 102F   FF9B      00700          LBLE    INIT
7B95 8E     7C44      00710          LDX     #LL
7B98 A6     84        00720          LDA     ,X
7B9A 4D               00730          TSTA
7B9B 27     0F        00740          BEQ     FINISH
7B9D 4F               00750          CLRA
7B9E B7     7C44      00760          STA     LL
7BA1 86     A9        00770          LDA     #169
7BA3 17     0032      00780          LBSR    PNT
7BA6 8E     0E10      00790          LDX     #3600
7BA9 16     FF61      00800          LBRA    GO
7BAC 86     1B        00810 FINISH   LDA     #27
7BAE AD     9F A002   00820          JSR     [$A002]
7BB2 86     13        00830          LDA     #19
7BB4 AD     9F A002   00840          JSR     [$A002]
7BB8 86     1B        00850          LDA     #27
7BBA AD     9F A002   00860          JSR     [$A002]
7BBE 86     36        00870          LDA     #54
7BC0 AD     9F A002   00880          JSR     [$A002]
7BC4 4F               00890          CLRA
7BC5 5F               00900          CLRB
7BC6 FD     7C49      00910          STD     ROWCMP
7BC9 86     01        00920          LDA     #1
7BCB B7     7C43      00930          STA     UL
7BCE B7     7C44      00940          STA     LL
7BD1 B7     7C45      00950          STA     UR
7BD4 B7     7C46      00960          STA     LR
7BD7 39               00970          RTS
7BD8 0F     6F        00980 PNT      CLR     $6F
7BDA 34     12        00990          PSHS    X,A
7BDC 8E     0400      01000          LDX     #$400
7BDF A7     80        01010 CLS      STA     ,X+
7BE1 8C     0600      01020          CMPX    #$600
7BE4 26     F9        01030          BNE     CLS
7BE6 8E     7C03      01040          LDX     #MSG
7BE9 A6     84        01050 PRINT    LDA     ,X
7BEB 30     01        01060          LEAX    1,X
7BED AD     9F A002   01070          JSR     [$A002]
7BF1 81     0D        01080          CMPA    #$0D
7BF3 26     F4        01090          BNE     PRINT
7BF5 AD     9F A000   01100 WAIT     JSR     [$A000]
7BF9 27     FA        01110          BEQ     WAIT
7BFB 86     FE        01120          LDA     #-2
7BFD 97     6F        01130          STA     $6F
7BFF 35     12        01140          PULS    X,A
7C01 39               01150          RTS
7C02        00        01160 COUNT    FCB     0
7C03        50        01170 MSG      FCC
'PRESS A KEY WHEN PRINTER IS      ALINED
```

Figure 1
Actual Size

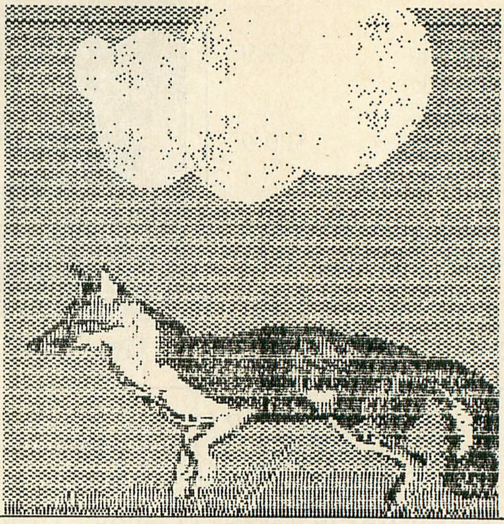


Figure 2
Portion of printout's actual size

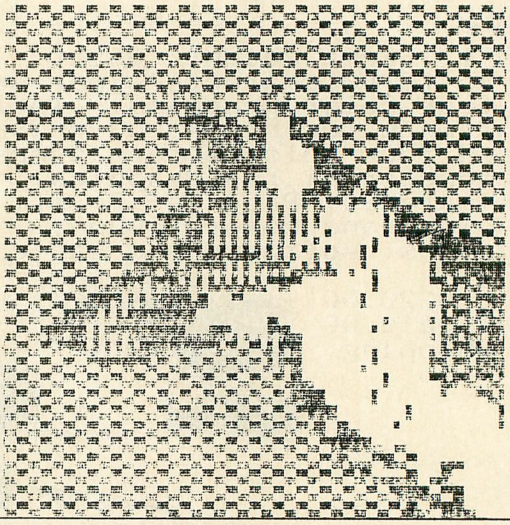
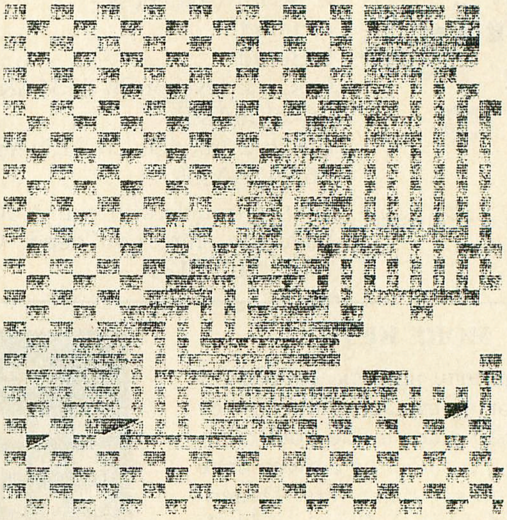


Figure 3
Portion of printout's actual size



```
AT THE TOP OF A NEW PAGE'
7C42       0D        01180            FCB      $0D
7C43       01        01190 UL         FCB      1
7C44       01        01200 LL         FCB      1
7C45       01        01210 UR         FCB      1
7C46       01        01220 LR         FCB      1
7C47       E0        01230 CHRTB      FCB      224
7C48       EF        01240            FCB      239
7C49       00        01250 ROWCMP     FCB      0
7C4A       00        01260            FCB      0
           7C4B      01270 DONE       EQU      *
           0000      01280            END

00000 TOTAL ERRORS
```

Listing 4: NORMAL

```
                     00100            TITLE    NORMAL
7D00                 00110            ORG      $7D00
7D00 7E    7D05      00120 BEGIN      JMP      START
7D03       010A      00130            FDB      DONE-BEGIN
7D05 86    12        00140 START      LDA      #18
7D07 97    96        00150            STA      150
7D09 8E    0E00      00160            LDX      #3584
7D0C 31    88 20     00170            LEAY     32,X
7D0F 10BF  7E08      00180            STY      ROWCMP
7D13 86    FE        00190            LDA      #-2
7D15 97    6F        00200            STA      $6F
7D17 86    1B        00210            LDA      #27
7D19 AD    9F A002   00220            JSR      [$A002]
7D1D 86    14        00230            LDA      #20
7D1F AD    9F A002   00240            JSR      [$A002]
7D23 86    1B        00250            LDA      #27
7D25 AD    9F A002   00260            JSR      [$A002]
7D29 86    1C        00270            LDA      #28
7D2B AD    9F A002   00280            JSR      [$A002]
7D2F 86    08        00290 INIT       LDA      #8
7D31 B7    7DF3      00300            STA      COUNT
7D34 A6    84        00310            LDA      ,X
7D36 30    88 20     00320            LEAX     32,X
7D39 E6    84        00330            LDB      ,X
7D3B 30    88 E0     00340            LEAX     -32,X
7D3E 49              00350 LOOP1      ROLA
7D3F 25    03        00360            BCS      NO1
7D41 7F    7DF4      00370            CLR      UL
7D44 49              00380 NO1        ROLA
7D45 25    03        00390            BCS      NO2
7D47 7F    7DF6      00400            CLR      UR
7D4A 59              00410 NO2        ROLB
7D4B 25    03        00420            BCS      NO3
7D4D 7F    7DF5      00430            CLR      LL
7D50 59              00440 NO3        ROLB
7D51 25    03        00450            BCS      NO4
7D53 7F    7DF7      00460            CLR      LR
7D56 34    06        00470 NO4        PSHS     D
7D58 4F              00480            CLRA
7D59 7D    7DF4      00490            TST      UL
7D5C 26    02        00500            BNE      NXT1
7D5E 86    01        00510            LDA      #1
7D60 7D    7DF5      00520 NXT1       TST      LL
7D63 26    02        00530            BNE      NXT2
7D65 8B    04        00540            ADDA     #4
7D67 7D    7DF6      00550 NXT2       TST      UR
7D6A 26    02        00560            BNE      NXT3
7D6C 8B    02        00570            ADDA     #2
7D6E 7D    7DF7      00580 NXT3       TST      LR
7D71 26    02        00590            BNE      NXT4
7D73 8B    08        00600            ADDA     #8
7D75 1F    89        00610 NXT4       TFR      A,B
7D77 34    10        00620            PSHS     X
7D79 8E    7DF8      00630            LDX      #CHRTB
7D7C 3A              00640            ABX
7D7D A6    84        00650            LDA      ,X
7D7F AD    9F A002   00660            JSR      [$A002]
7D83 35    10        00670            PULS     X
7D85 86    01        00680            LDA      #1
7D87 B7    7DF4      00690            STA      UL
7D8A B7    7DF5      00700            STA      LL
7D8D B7    7DF6      00710            STA      UR
7D90 B7    7DF7      00720            STA      LR
7D93 B6    7DF3      00730            LDA      COUNT
7D96 80    02        00740            SUBA     #2
7D98 4D              00750            TSTA
7D99 27    07        00760            BEQ      NXTBYT
7D9B B7    7DF3      00770            STA      COUNT
7D9E 35    06        00780            PULS     D
7DA0 20    9C        00790            BRA      LOOP1
7DA2 35    06        00800 NXTBYT     PULS     D
7DA4 30    01        00810            LEAX     1,X
7DA6 BC    7E08      00820            CMPX     ROWCMP
7DA9 27    02        00830            BEQ      NXTROW
7DAB 20    82        00840            BRA      INIT
7DAD 30    88 20     00850 NXTROW     LEAX     32,X
7DB0 31    88 20     00860            LEAY     32,X
7DB3 10BF  7E08      00870            STY      ROWCMP
7DB7 86    0D        00880            LDA      #13
7DB9 AD    9F A002   00890            JSR      [$A002]
7DBD 8C    25FF      00900            CMPX     #9727
7DC0 102F  FF6B      00910            LBLE     INIT
7DC4 86    1B        00920            LDA      #27
7DC6 AD    9F A002   00930            JSR      [$A002]
7DCA 86    13        00940            LDA      #19
7DCC AD    9F A002   00950            JSR      [$A002]
7DD0 86    1B        00960            LDA      #27
7DD2 AD    9F A002   00970            JSR      [$A002]
7DD6 86    36        00980            LDA      #54
7DD8 AD    9F A002   00990            JSR      [$A002]
7DDC 86    01        01000            LDA      #1
7DDE 7F    7DF3      01010            CLR      COUNT
7DE1 B7    7DF4      01020            STA      UL
7DE4 B7    7DF5      01030            STA      LL
7DE7 B7    7DF6      01040            STA      UR
7DEA B7    7DF7      01050            STA      LR
7DED 4F              01060            CLRA
7DEE 5F              01065            CLRB
7DEF FD    7E08      01070            STD      ROWCMP
7DF2 39              01080            RTS
7DF3       00        01090 COUNT      FCB      0
7DF4       01        01100 UL         FCB      1
7DF5       01        01110 LL         FCB      1
7DF6       01        01120 UR         FCB      1
7DF7       01        01130 LR         FCB      1
7DF8       E0        01140 CHRTB      FCB      224
7DF9       E1        01150            FCB      225
7DFA       E2        01160            FCB      226
7DFB       E7        01170            FCB      231
7DFC       E3        01180            FCB      227
7DFD       E9        01190            FCB      233
7DFE       E6        01200            FCB      230
7DFF       EB        01210            FCB      235
7E00       E4        01220            FCB      228
7E01       E5        01230            FCB      229
7E02       EA        01240            FCB      234
7E03       EC        01250            FCB      236
7E04       E8        01260            FCB      232
7E05       ED        01270            FCB      237
7E06       EE        01280            FCB      238
7E07       EF        01290            FCB      239
7E08       00        01300 ROWCMP     FCB      0
7E09       00        01310            FCB      0
           7E0A      01320 DONE       EQU      *
           0000      01330            END

00000 TOTAL ERRORS
```

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- Correction on all input screens
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- Correction on all input screens
- Raw dump of data to the printer — for the player and opposing team's files
- Summary of the player and opposing team's stats
- Track 22 individual player stats with 18 cum stats per player
- Summarizes 17 individual player team stats
- Compile opposing team summary of 19 separate stats

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64K Custom Setup

By James J. Ruggles

It happened again. You start to LLIST your new program and the printer is off. Even before this you had to POKE in the right printer Baud rate.

Ever wonder what ROM versions are in that great magic machine called a CoCo?

64K Custom Setup takes care of these problems. It also changes the Extended BASIC sign-on message and Disk BASIC sign-on message, defines a new cursor, and gets rid of the dreaded OK when a program crashes. You can speed up the disk drive so it operates at its maximum speed and efficiency.

All these wonderful and fantastic things must, of course, be done in the 64K all-RAM mode.

I'm a firm believer in "if a program isn't an educational experience, then it isn't worth typing in." This is my philosophy and I've tried to apply it in every aspect of this program.

When the screen clears, notice that the printer status, Baud rate and step rate are flickering. This is to remind you that they can be changed.

To change the printer Baud rate, press '5'. The line that reads Printer Baud Rate changes to Enter Desired Baud Rate. Enter in the printer's Baud rate. It must be less than 10,000 Baud and this number replaces the 650 in Line 19.

To change the disk drive step rate and considerably increase its operating speed, press '6'. The line that reads Step Rate (Millisecs.), changes to Step Rate 30, 20, 12 or 6?. Enter 30, 20, 12 or 6; nothing else is accepted. Use the lowest number that allows the drive to operate properly. Then replace the 30 in Line 24 with this same number.

To end the program, press a number from '1' to '4'. Pressing '1' executes a NEW. Pressing '2' initializes BASIC "warm start." Key '3' simulates a cold start. This causes the printer Baud rate to default to 600 Baud and it's necessary to POKE 65503,127 to get back into the 64K mode. Key '4' does an END.

How are we going to accomplish all this? It's not too difficult, if we write the program in modular form. Any of the modules can be deleted or new modules can be added. If you don't have a disk drive, delete the disk drive section. If a printer isn't in use, the printer section can be deleted. Add and delete the modules of choice.

The sign-on messages and OK prompt can be changed to any printable characters. POKE different numbers into memory locations 41380 and 41384 and watch what happens. They both affect the cursor.

If your CoCo won't handle the triple speed POKE, try the double speed POKE. If neither one works, just delete them. In fact it's best to REM out these two POKEs until certain the program is functioning properly. Otherwise CoCo might hang up and you won't know if the computer or program is at fault.

A word of caution. Don't make any changes until sure that the whole program is working properly because, if you do, it may not work at all.

All the REM lines can be deleted without affecting the operation of the program. But they can be really useful in making changes.

After the typing is done, save the setup with CSAVE"SETUP" for a tape system or SAVE"SETUP/BIN" for a disk system. Be sure to save several copies before attempting to run it, for a single typo could cause *Setup* to crash.

Everything else is pretty much self-explanatory. If you have any questions, comments, additions or suggestions, please feel free to write me at Warner #3, East Ryegate, VT 05042. Be sure to enclose an SASE if you want a reply and I'll do my best to get back to you. ☐

Jim Ruggles lives in East Ryegate, Vermont, and has had an interest in computers for the past 20 years. He has an amateur radio and FCC license.

The listing: 64KSETUP

```
1 '64K CUSTOM SETUP
2 'BY JIMMY J. RUGGLES
3 '
4 ' SPEED UP POKES
5 'DOUBLE SPEED POKE
6 'POKE65495,0
7 '
8 'TRIPLE SPEED POKE
9 POKE65497,0
10 '
11 'TURN OFF 64K
12 POKE65502,127
13 '
14 X=0:Y=0:Z=0
15 '
16 'PRINTER BAUD RATE
17 'CHANGE THE 650 TO YOUR
18 'PRINTERS BAUD RATE
19 BAUD=650
20 '
21 'DRIVE STEP RATE
22 'CHANGE THE 6 TO MATCH THE
23 'STEP RATE OF YOUR DRIVE
24 DISK=6
25 '
26 'BLANK OUT SCREEN UNTIL ALL
27 'TEXT IS PRINTED &
28 'CLEAR SCREEN TO BLACK
29 PCLS5:SCREEN1,1:CLS0
30 '
31 'TEST FOR TOP OF MEMORY
32 'IF MEM <>32766 THEN BYPASS
33 'ALL 64K FUNCTIONS
34 ME=PEEK(116)*256+PEEK(117):IF
 ME<>32766 THEN50
35 '
36 'RELOCATE ROM TO RAM
37 'ENTER 64K MODE,ROM MAP 1
38 '
39 DATA 26,80,142,128,0,166,132,
183,255,223,167,128,140,224,0,39
,5,183,255,222,32,239,28,175,57
40 FOR A=3072 TO 3096:READB:POKE
A,B:NEXTA:EXEC3072
41 '
42 'NEW SIGN ON MESSAGE
```

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```
43 'FOR EXTENDED COLOR BASIC
44 '
45 DATA54,52,75,32,67,85,83,84,7
9,77,32,83,69,84,85,80,32,32,32,
32,32,32,32,13,66,89,32,74,73,77
,77,89,32,74,46,32,82,85,71,71,7
6,69,83,32,49,57,56,53,32,32,32,
13,78,79,87,32,73,78,32,54,52,75
,32,65,76,76,32,82,65,77,32,77,7
9,68,69,32,32,32,32,32,32
46 FORG=33000TO33080:READH:POKEG
,H:NEXTG
47 '
48 'SET PRINTER BAUD RATE
49 '
50 IF BAUD<1 THEN BAUD=1
51 B=(55930/BAUD)-5
52 IF B<256THEN54
53 IF B>255THEN C$=HEX$(B):GOTO5
6 ELSE56
54 IF B<1 THEN B=1
55 POKE149,0:POKE150,B:GOTO57 EL
SE57
56 D$=RIGHT$(C$,2):D=VAL("&H"+(D
$)):E$=LEFT$(C$,1):E=VAL("&H"+(E
$)):POKE149,E:POKE150,D
57 BAUD$=STR$(BAUD):PRINT@288,"P
RINTER BAUD RATE"
58 PRINT@314,"    ";:PRINT@312,C
HR$(34);:PRINT@313,BAUD$;:PRINT@
318,CHR$(34)
59 IF Z=1 THEN RETURN
60 '
61 'IS PRINTER ON OR OFF
62 '
63 PRINT@256,"PRINTER (ON/OFF) L
INE?":IFPEEK(65314)/2<>INT (PEEK
(65314)/2) THENPRINT@282,"OFF":E
LSEPRINT@282,"ON"
64 IF X=1 THEN RETURN
65 '
66 'IS DISK DRIVE PLUGGED IN
67 IFPEEK(49152)<>68 THEN109
68 '
69 'TURN OFF 64K
70 POKE65502,127
71 '
72 'DISK ROM VERSION
73 '
74 DECB$=CHR$(PEEK(49472))+CHR$(
PEEK(49473))+CHR$(PEEK(49474)):I
F DECB$="1.0" THEN77
75 DECB$=CHR$(PEEK(49491))+CHR$(
PEEK(49492))+CHR$(PEEK(49493)):I
F DECB$="1.1" THEN77
76 DECB$="???"
77 PRINT@128,"DISK ROM ":PRINT@1
53,CHR$(34)DECB$CHR$(34)
78 '
```

```
79 IF ME<>32766 THEN93
80 '
81 'TURN ON 64K
82 POKE65503,127
83 '
84 'NEW DISK SIGN ON MESSAGE
85 '
86 DATA54,52,75,32,67,85,83,84,7
9,77,32,83,69,84,85,80,32,40,68,
73,83,75,32,86,69,82,83,73,79,78
,41,32,66,89,32,74,73,77,77,89,3
2,74,46,32,82,85,71,71,76,69,83,
32,49,57,56,53,32,32,32,13,78,79
,87,32,73,78,32,54,52,75,32,65,7
6,76,32,82,65,77,32,77,79
87 DATA68,69,32,32,32,32,32,32
88 IF DECB$="1.0" THENFOR I=4944
6 TO 49531:READJ:POKEI,J:NEXTI
89 IF DECB$="1.1" THENFOR I=4946
5 TO 49550:READJ:POKEI,J:NEXTI
90 '
91 'CHANGE DRIVE STEP RATE
92 '
93 IFDISK=30 THENY=23 ELSEIFDISK
=20 THENY=22 ELSEIFDISK=12 THENY
=21 ELSEIFDISK=6 THENY=20
94 DISK$=STR$(DISK):PRINT@192,"S
TEP RATE (MILISECS.)
95 PRINT@219,"  ";:PRINT@217,CHR
$(34);:PRINT@218,DISK$;:PRINT@22
1,CHR$(34)
96 IF Y=1 THEN RETURN
97 IF DECB$="1.0" THENPOKE54989,
0:POKE55075,Y
98 IF DECB$="1.1" THENPOKE55232,
0:POKE55318,Y
99 '
100 'MOTOR START UP TIME REDUCER
101 'ELIMINATE ONE DELAY LOOP
102 '
103 IF DECB$="1.0" THENFOR R=549
37 TO 54939:POKER,18:NEXTR
104 IF DECB$="1.1" THENFOR R=551
80 TO 55182:POKER,18:NEXTR
105 '
106 VERIFY ON
107 '
108 'TURN OFF 64K
109 POKE65502,127
110 '
111 'EXT. COLOR BASIC ROM VERS.
112 '
113 ECB$=CHR$(PEEK(33021))+CHR$(
PEEK(33022))+CHR$(PEEK(33023))
114 IF ECB$="1.0" OR ECB$="1.1"
THEN115 ELSE119
115 PRINT@64,"EXTENDED COLOR BAS
IC ROM "CHR$(34)ECB$CHR$(34)
116 '
```

```
117 'COLOR BASIC ROM VERSION
118 '
119 CB$=CHR$(PEEK(41299))+CHR$(P
EEK(41300))+CHR$(PEEK(41301))
120 PRINT@96,"COLOR BASIC ROM ":
PRINT@121,CHR$(34)CB$CHR$(34)
121 '
122 'DISPLAY SCREEN HEADING
123 '
124 IF ME=32766 THEN125 ELSEPRIN
T@10,"CUSTOM SETUP";:GOTO147 ELS
E147
125 PRINT@8,"64K CUSTOM SETUP";
126 '
127 'TURN ON 64K
128 POKE65503,127
129 '
130 'CHANGE CURSOR
131 'CAN BE ALMOST ANY
132 'ASCII CHARACTER CODE
133 POKE41384,127
134 '
135 'CHANGE OK PROMPT
136 'TO ANY PRINTABLE
137 'ASCII CHARACTER CODE
138 POKE44014,74:POKE44015,82
139 '
140 'CHANGE TRON [] TO --
141 'EASIEST TO READ
142 'OF ALL THE SYMBOLS
143 POKE33507,45:POKE33517,45
144 '
145 'END OF PROGRAM PROMPTS
146 '
147 PRINT@352,"1=NEW":PRINT@384,
"2=WARM START":PRINT@416,"3=COLD
 START":PRINT@371,"4=NORM START"
:PRINT@403,"5=BAUD RATE"
148 IFPEEK(49152)=68 THENPRINT@4
35,"6=STEP RATE"
149 '
150 'SIGNAL END OF OF WAIT
151 SOUND200,1
152 '
153 'BACK TO NORMAL SPEED
154 '
155 'DOUBLE SPEED SLOWDOWN
156 'USE WITH LINE # 6
157 'POKE65494,0
158 '
159 'TRIPLE SPEED SLOWDOWN
160 'USE WITH LINE # 9
161 POKE65496,0
162 '
163 'GREEN TO ORANGE SCREEN
164 POKE359,57:SCREEN0,1
165 '
166 S$=INKEY$
167 '
```

```
168 IF PEEK(49152)<>68 THEN176
169 '
170 'DISPLAY DRIVE STEP RATE
171 '
172 Y=1:GOSUB95
173 '
174 'DISPLAY PRINTER BAUD RATE
175 '
176 Z=1:GOSUB58
177 '
178 'UPDATE PRINTER (ON/OFF)
179 X=1:GOSUB63
180 '
181 'SELECT PROGRAM END
182 '
183 IF S$=""THEN166
184 IF S$="1" THEN CLS:GOSUB195:
NEW
185 IF S$="2" THEN CLS:EXEC32768
186 IF S$="3" THEN POKE65502,127
:POKE113,0:EXEC40999
187 IF S$="4" THEN CLS:GOSUB195:
END
188 IF S$="5" THEN204
189 IF PEEK(49152)<>68 THEN166
190 IF S$="6" THEN211
191 GOTO166
192 '
193 'DISPLAY SIGN ON MESSAGE
194 '
195 IF DECB$="1.0" THENFOR G=494
46 TO 49531:H$=CHR$(PEEK(G)):PRI
NTH$;:NEXTG
196 IF DECB$="1.1" THENFOR G=494
65 TO 49550:H$=CHR$(PEEK(G)):PRI
NTH$;:NEXTG:RETURN
197 FOR G=33000 TO 33080:H$=CHR$
(PEEK(G)):PRINTH$;:NEXTG
198 RETURN
199 '
200 'ENTER THE HIGHEST NUMBER
201 'THAT WILL STILL ALLOW YOUR
202 'PRINTER TO OPERATE
203 '
204 PRINT@288,"    ":PRINT@288,"
ENTER DESIRED BAUD RATE";:INPUTB
AUD
205 IF BAUD=0THEN204 ELSEX=1:GOS
UB50:SOUND200,1:GOTO166 ELSE166
206 '
207 'CHANGE DRIVE STEP RATE
208 'THE LOWER THE RATE
209 'THE FASTER THE DRIVE
210 '
211 PRINT@192,"  ":PRINT@192,"ST
EP RATE 30,20,12 OR 6 ";:INPUTDI
SK
212 IF DISK=30 OR DISK=20 OR DIS
K=12 OR DISK=6 THEN93 ELSE211
```

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King Author - writing tool	2-6	16/32 Ext.	29.95
Cocowheel of Fortune	4-up	32K-Ext.	19.95
Context Clues	2-3	32K-Ext.	19.95

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French Baseball-500wds.	4-up	32K-Ext.	19.95
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Spanish Baseball-500wds	4-up	32K-Ext.	19.95
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Memory Castle-Sunburst	4-up	32K-disk	44.95
Factory by Sunburst	4-up	32K-disk	44.95
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Inner City - simulation	7-up	32K-disk	49.95
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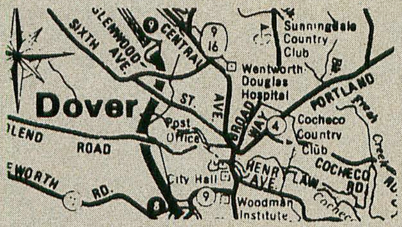

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PRINTER UTILITY

16K
ECB

Plain Jane Print Needs an Appointment with the Stylist

By Gene Short

For all CoCo owners using an Epson or Epson-compatible printer, *Print Stylist* is a program that sets your printer for any of the many print style combinations available on the Epson. Best of all, you don't have to worry or fret about printer codes. Even if you don't have an Epson printer, the program can easily be modified by changing the printer codes in the program for your specific printer (see Printer Code Usage Table).

The program is menu driven and print style options can be toggled on and off by simply pressing the appropriate key. Printer codes remain in effect until the printer is turned off or changed by another program. Use this program to set your printer to be used with a favorite word processor. The program can also be used as a single-line typewriter. Since the printer must remain online to receive the printer codes, the program constantly monitors the status of the printer and lets you know when the printer is offline.

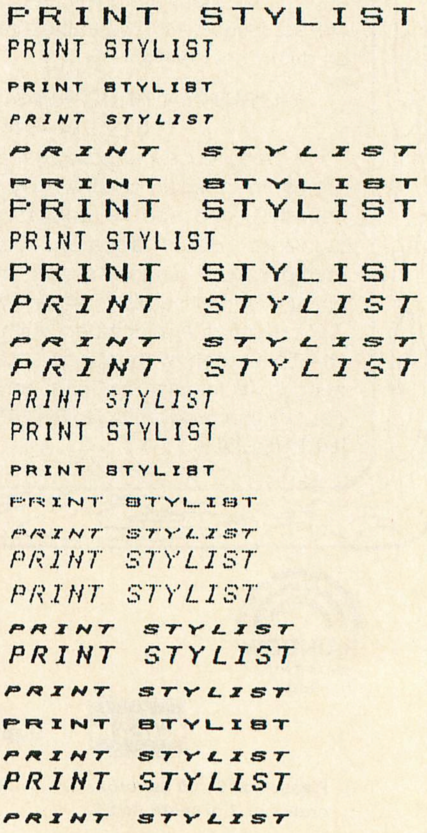
Instructions aren't necessary to use this program. The menu is self-explanatory. Although very easy to use, the following explains in detail how the program works.

The program uses two screens. The first screen to appear is the *Print Stylist* selection menu. This is the menu to select print style combinations. The following styles are available: pica, elite, italics, emphasized, subscript, expanded, compressed, double strike and underline.

By pressing the key associated with the desired style, an '*' appears, indicating this print type is on. Pressing the key again turns the print type off. It's not necessary to press ENTER. Try different combinations by selecting more than one print style. At any time you may see the effects of the selections by pressing the 'P' (Print Option). You may also change the Baud rate by pressing the 'B' (Baud Rate) key until the desired Baud rate is displayed. (Don't forget to change the Baud rate on the printer's interface.) To reset the printer to normal status, press the 'R' (Reset) key.

By the way, when the menu first appears, it is possible to immediately start your selections, even while the title is being displayed across the screen. When ready to exit the program, press the '@' key. The printer codes selected remain in effect and the computer returns to BASIC. You can now load your word processor or any other program and use that print style.

Sample Printout:



```
PRINT STYLIST
PRINT STYLIST
PRINT STYLIST
PRINT STYLIST
PRINT STYLIST
PRINT STYLIST
PRINT STYLIST
PRINT STYLIST
PRINT STYLIST
PRINT STYLIST
PRINT STYLIST
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PRINT STYLIST
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PRINT STYLIST
PRINT STYLIST
PRINT STYLIST
PRINT STYLIST
```

Gene Short is the data processing manager for a food distributor and a member of D.P.M.A. His primary language is COBOL and he has been a CoCo owner and RAINBOW subscriber for two years. He lives in Charleston, West Virginia with his wife, Jo Ellen, and sons, Chip and Jeff.

The other screen is the line input screen that can be used as a single-line typewriter. Press the '!' key from the *Print Stylist* selection menu to access this screen. Type the line to be printed then press ENTER. The printer prints the line in the font combinations you have selected. Pressing ENTER without typing anything generates a line feed. This line input screen is also good for printing on preprinted forms. For example, to print an amount in a box on a form that starts in column 50, space over to 50 then enter the amount. To return to the *Print Stylist* selection menu, press the '!' key then press ENTER.

To see a demonstration of the various print style combinations, press '?' for Print Demo from the *Print Stylist* selection menu. This option delivers a full page of print styles at random. Since the Demo option uses a random number generator to determine the style to be printed — all possible print style combinations may not be selected and others may be selected more than once. Each time the Demo is requested, the results will be different. Run it a few times and see your printer in action using *Print Stylist*.

This has become a very popular program in our computer club. It's not only fun to use but also has proven to be a valuable printer utility.

(You may send your questions about this program to Mr. Short at 108 Kendra Road, Charleston, WV 25311. Please enclose an SASE.) ☐

Table One: Printer Code Usage Table

The following table shows each program line that contains print codes and explains their usage. To modify this program for another printer, simply look up the print codes in the printer manual and edit the program lines changing the printer codes for your printer.

Line Number	Epson Print Codes	Explanation
450	CHR$(27)"2"	Sets line spacing to six LPI
940	CHR$(27)"2"	Same as above
1070	CHR$(27)"2"	Same as above
1090	CHR$(12)	Feeds form to top of page
1120	CHR$(27)CHR$(64)	Sets printer to normal print mode
1120	CHR$(27)"A"CHR$(0)	Sets line spacing to zero
1150	CHR$(27)"P"	Turns on pica (overides elite)
1170	CHR$(27)"M"	Turns on elite (overides pica)
1190	CHR$(27)"4"	Turns on italic
1200	CHR$(27)"5"	Turns off italic
1220	CHR$(27)"W1"	Turns on expanded
1230	CHR$(27)"W0"	Turns off expanded
1250	CHR$(15)	Turns on compressed
1260	CHR$(18)	Turns off compressed
1280	CHR$(27)"S1"	Turns on subscript
1290	CHR$(27)"T"	Turns off subscript
1310	CHR$(27)"E"	Turns on emphasized
1320	CHR$(27)"F"	Turns off emphasized
1340	CHR$(27)"G"	Turns on double strike
1350	CHR$(27)"H"	Turns off double strike
1370	CHR$(27)"-1"	Turns on underline
1380	CHR$(27)"-0"	Turns off underline
1500	CHR$(27)"2"	Sets line spacing to six LPI
1510	CHR$(27)"A"CHR$(0)	Sets line spacing to zero

The listing: STYLIST

```
100 '::::::::::::::::::::::
110 '::                  ::
120 '::   STYLIST ..     ::
130 '::   WRITTEN BY     ::
140 '::   GENE SHORT     ::
150 '::                  ::
160 '::::::::::::::::::::::
170 '
180 A$="  PRINT STYLIST SELECTIO
N MENU"
190 CLS
200 PE=PEEK(65314)AND1
210 IF PE=0 GOTO230
220 PRINT@193,"** PLEASE TURN PR
INTER ON **":GOTO200
230 X=1:POKE150,1:CLS
240 PX$="PRINTER IS NOW SET FOR
THIS PRINT STYLE"
250 A1$="*":B$="9600":BCT=5
260 GOTO1110
270 REM - LINE INPUT ROUTINE
280 CLS
290 PRINT@0,"      LINE INPUT SC
REEN"
300 PRINT@32,"1...5....10...15..
.20...25...30."
310 PRINT@96,"..35...40...45...5
0...55...60..."
320 PRINT@160,"65...70...75...80
"
330 PRINT@192,"-----------------
--------------"
340 PRINT@320,"-----------------
---CHARACTERS--"
350 PRINT@448,"ENTER ! FOR PRINT
```

```
 STYLIST MENU"
360 PRINT@224," ":PRINT@256," ":
PRINT@288," "
370 C=128+16*(3-1)+12
380 FORI=224TO303
390 PRINT@I,CHR$(C)
400 NEXTI
410 PRINT@304,"**** END OF 80 "
420 PRINT@222,CHR$(45)
430 LINE INPUT X$
440 IF X$="!" THEN GOTO 490
450 PRINT#-2,CHR$(27)"2";X$
460 PRINT@288," "
470 PRINT@256," "
480 GOTO 290
490 CLS
500 REM - PRINTER DRIVER ROUTINE
510 IFSW=1GOTO1070
520 IF X=32 THEN PRINT @0,A$
530 PRINT@32,A1$;"A = PICA
    WRITTEN BY"
540 PRINTA2$;"L = ELITE
 GENE SHORT"
550 PRINTA3$;"I = ITALIC"
560 PRINTA4$;"X = EXPANDED"
570 PRINTA5$;"C = COMPRESSED"
580 PRINTA6$;"S = SUBSCRIPT"
590 PRINTA7$;"E = EMPHASIZED"
600 PRINTA8$;"D = DOUBLE-STRIKE"
610 PRINTA9$;"U = UNDERLINE"
620 PRINT" R = RESET ALL PRINTER
 CODES"
630 PRINT" B = BAUD RATE - ";B$
640 PRINT" P = PRINT STYLE ? = P
RINT DEMO"
650 PRINT" ! = SINGLE-LINE 'TYPE
WRITER'"
660 PRINT" @ = EXIT PROGRAM"
670 O$=INKEY$
680 IFX=32GOTO710
690 PRINT@31-X,LEFT$(A$,X)
700 X=X+1
710 PE=PEEK(65314)AND1
720 IF PE=0 GOTO780
730 CLS
740 PRINT@193,"**  PRINTER IS OF
F LINE  **"
750 PE=PEEK(65314)AND1
760 IF PE=0 GOTO490
770 GOTO750
780 IF O$="@" THEN GOTO 1500
790 IF O$="!"THEN GOTO 280
800 IF O$="P"ORO$="p" THEN GOTO
940
810 IF O$="R"ORO$="r" THEN GOTO
1110
```

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About The One-Liner Contest . . .

THE RAINBOW's One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be *very* short.

Send your entry (preferably on cassette) to:

THE RAINBOW One-Liner Contest
P.O. Box 385
Prospect, KY 40059

```
820 IF O$="A"ORO$="a" THEN GOTO
1140
830 IF O$="L"ORO$="l" THEN GOTO
1160
840 IF O$="I"ORO$="i" THEN GOTO
1180
850 IF O$="X"ORO$="x" THEN GOTO
1210
860 IF O$="C"ORO$="c" THEN GOTO
1240
870 IF O$="S"ORO$="s" THEN GOTO
1270
880 IF O$="E"ORO$="e" THEN GOTO
1300
890 IF O$="D"ORO$="d" THEN GOTO
1330
900 IF O$="U"ORO$="u" THEN GOTO
1360
910 IF O$="B"ORO$="b" THEN GOTO
1390
920 IF O$="?"THEN GOTO960
930 GOTO670
940 PRINT#-2,CHR$(27)"2";PX$
950 GOTO500
960 SW=1:PX$="PRINT STYLIST DEMO
NSTRATION"
970 N=4
980 FORXY=1TO60
990 RN=RND(N)
1000 IF XY=1 THEN RN=3
1010 IF XY=2 THEN RN=4
1020 IF XY=19 AND A5$="*" THEN R
N=4
1030 IF XY=20 THEN N=3:RN=9
1040 IF XY=35 THEN N=4:RN=8
1050 IFXY=45 THEN N=7:RN=5
1060 ON RN GOTO 1180,1210,1270,1
240,1360,1300,1330,1140,1160
1070 PRINT#-2,CHR$(27)"2";PX$
1080 NEXTXY
1090 PRINT#-2,CHR$(12)
1100 SW=0:PX$="PRINTER IS NOW SE
T FOR THIS PRINT STYLE"
1110 GOSUB1510:A1$="*":A2$=" ":A
3$=" ":A4$=" ":A5$=" ":A6$=" ":A
7$=" ":A8$=" ":A9$=" "
1120 PRINT#-2,CHR$(27)CHR$(64)CH
R$(27)"A"CHR$(0)
1130 GOTO 500
1140 GOSUB1510:IF A1$="*" THEN G
OTO 500
1150 A1$="*":PRINT#-2,CHR$(27)"P
":A2$=" ":GOTO500
1160 GOSUB1510:IF A2$="*" THEN G
OTO 500
1170 A1$=" ":PRINT#-2,CHR$(27)"M
":A2$="*":GOTO500
1180 GOSUB1510:IF A3$="*"THEN GO
TO 1200
```

```
1190 A3$="*":PRINT#-2,CHR$(27)"4
":GOTO500
1200 A3$=" ":PRINT#-2,CHR$(27)"5
":GOTO500
1210 GOSUB1510:IF A4$="*"THEN GO
TO1230
1220 A4$="*":PRINT#-2,CHR$(27)"W
1":GOTO500
1230 A4$=" ":PRINT#-2,CHR$(27)"W
0":GOTO500
1240 GOSUB1510:IFA5$="*" THEN GO
TO1260
1250 A5$="*":PRINT#-2,CHR$(15):G
OTO500
1260 A5$=" ":PRINT#-2,CHR$(18):G
OTO500
1270 GOSUB1510:IF A6$="*"THEN GO
TO1290
1280 A6$="*":PRINT#-2,CHR$(27)"S
1":GOTO500
1290 A6$=" ":PRINT#-2,CHR$(27)"T
":GOTO500
1300 GOSUB1510:IF A7$="*" THEN G
OTO1320
1310 A7$="*":PRINT#-2,CHR$(27)"E
":GOTO500
1320 A7$=" ":PRINT#-2,CHR$(27)"F
":GOTO500
1330 GOSUB1510:IF A8$="*" THEN G
OTO1350
1340 A8$="*":PRINT#-2,CHR$(27)"G
":GOTO500
1350 A8$=" ":PRINT#-2,CHR$(27)"H
":GOTO500
1360 GOSUB1510:IFA9$="*" THEN GO
TO1380
1370 A9$="*":PRINT#-2,CHR$(27)"-
1":GOTO500
1380 A9$=" ":PRINT#-2,CHR$(27)"-
0":GOTO500
1390 GOSUB1510:BCT=BCT+1:IF BCT>
5 THEN BCT=1
1400 IF BCT=1 THEN GOTO1450
1410 IF BCT=2 THEN GOTO1460
1420 IF BCT=3 THEN GOTO1470
1430 IF BCT=4 THEN GOTO1480
1440 B$="9600":POKE150,1:GOTO500
1450 B$=" 600":POKE150,87:GOTO50
0
1460 B$="1200":POKE150,41:GOTO50
0
1470 B$="2400":POKE150,18:GOTO50
0
1480 B$="4800":POKE150,7:GOTO500
1490 GOTO 500
1500 PRINT#-2,CHR$(27)"2":POKE11
3,3:EXEC40999
1510 PRINT#-2,CHR$(27)"A"CHR$(0)
1520 RETURN
```

Setting the Stage for 'Spring Cleaning'

By Cray Augsburg
Rainbow's CoCo SIGop

We extend a mighty welcome to Marty Goodman (MARTYGOODMAN). Marty is now manager of the database on our Color Computer SIG on Delphi. This change went into effect March 1, 1986.

Marty Goodman is a physician trained in anesthesiology and has also practiced general medicine at the Haight-Ashbury Free Medical Clinic where he was medical director for two years. He is also an avid electronics tinkerer. Over the last several years, Marty has been involved in a wide variety of aspects of the Color Computer. These areas include software and hardware design, marketing and consulting, telecommunications and technical writing. He is probably best known in the CoCo Community for the following: his published articles in CoCo magazines, for his introduction of *Graphicom* and *WEFAX* to the CoCo world and for being an outspoken gadfly both on Delphi and CompuServe as well. His non-computer passions include running, mountaineering and outdoor photography. We are pleased to have Marty and his considerable experience on our Delphi Color SIG.

Cray Augsburg serves as RAINBOW's *technical assistant and holds an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Kentucky. His username on Delphi is RAINBOWMAG.*

We have begun restructuring of the database in an attempt to make it easier to use. We also hope to decrease the present delay in moving submitted programs into the public areas of the database. We hope to be running full steam ahead by the time you read this. If you have any questions or comments please MAIL them to Marty or me. We are open to any and all suggestions. For a detailed look at the present changes in the database area, we have included a somewhat lengthy report from our new database manager.

High Speed

The new 2400 Baud operation is now in effect. As stated in the past, there is no surcharge for using this feature. Now you can decrease your online costs by speeding up your uploads/downloads.

Database Manager's Report

By Marty Goodman

For the last few months, I had been nagging Jim Reed and Lonnie Falk with suggestions for improving the database area on Delphi's CoCo SIG. The upshot of all of this is that I have, in effect, been given the privilege of "putting up or shutting up." I am now part of the Delphi and Falsoft staff, with the responsibility of reorganizing and stocking the CoCo SIG database.

Allow me to explain briefly a little about the structure of our database, and then a little about the changes that should be in effect by the time you read this.

Delphi's Database

Delphi's database (storehouse of programs you may download and use at home) is divided into about a dozen different section topics. Each section topic is further divided into up to six official subtopics. This division into subtopics is accomplished by the database manager assigning "primary key

Just call Uninet or Tymnet to get the 2400 Baud access number for your area.

Dear Diary . . .

Here's a tidbit for newcomers as well as those "old-timers" who may have missed Jim Reed's announcement on the SIG. We have an online appointment/diary section available to users. *When in conference* you can type `/DIARY` (or just `/DI`) to get to this new area.

If you wish to schedule an appointment just ADD it to the system. You will be prompted for the date, time and location. Then, when you first logon to Delphi, if you have an appointment for that day, you will be prompted much as you are for new mail.

> ***"We have begun restructuring of the database in an attempt to make it easier to use."***

The diary area is similar to the appointment scheduler. Just enter the date and whatever text you wish to save. The text you enter goes into your personal work space and no one else will be able to read it.

These additions to the system will come in handy when you need to "write" something down or give yourself a little reminder. When you have a chance, give it a try.

Conference Save

Recently, a question in conference was, "Is there a way to save conference proceedings to your work space?" My answer was "no." To save a transcript of a conference session just type `/LOG` when in conference and a copy of the session will be saved in your work space area. To turn this feature off, just enter `/NOLOG`. The only catch to this is that you must be set for /REPEAT or your own comments will not be saved. I hope this helps some of you who might like to review something discussed in conference.

words" for each topic. When you go through the process of submitting a file to one of our sections in the database, you are asked to choose one of these six primary key words to associate with your file. Note that you also have the opportunity to assign any other key words of your own choosing, but the system requires that you assign one of ours as well. By assigning a "primary key word" you will have, in effect, placed your file in a given subtopic within the section topic. More will be written on this.

Section Topic Changes

Three previous section topics have been replaced with other topics. Education, Home Applications and News Notes are gone. In their places we have three new sections:

1) Hardware Hacking

This topic is for text files describing how to upgrade your CoCo, fixes for the Color Computer and for third-party hardware, patches for the system ROMs, binary images of alternate character generator ROMs for alternate character fonts for "lower kits" and for PBJ *Word Paks*, tips on how to customize your CoCo and third-party accessories, and various schematic diagrams.

The primary key words, or subtopics, for the hardware section are:

Firmware — material relating to ROMs or EPROMs

Memory — files relating to memory upgrades

Fixes — corrections for flaws in Radio Shack and other hardware

Custom CoCo — tips relating to enhancing your CoCo

Chip tips — general on CoCo-related hardware

Other — (all else!)

This section is very dear to my heart, as those who know me must realize. I have been a dedicated CoCo hardware hacker for years. I look forward to this unique opportunity to more effectively share my hacking experiences with you, and to allow you to share your discoveries and ideas about hardware with others. All hardware hackers: Take this as a warm personal invitation to drop by the Hardware Hacking area.

2) Utilities and Applications

This is, of course, a very broadly defined category. It appears in place of the old "Home Applications" category. In it, you will find mailing list, database, checkbook, directory utility and other such material. The key words are:

Printer — label makers, set-up routines . . .

Finance — database, mailing list, checkbook . . .

Diagnostics file management — directory utilities, file conversion . . .

Other

3) News and Reviews

This topic is subdivided as follows:

- Reviews

This subtopic is for members to tell other members of their experiences with given software and hardware products. No holds will be barred. I have always felt that while ads, product announcements and magazine reviews are helpful in deciding whether or not to get a given piece of software, one of the most reliable sources is the word of the owner and user of that software.

This section is created largely to enable you to get such information and to share it. Your reviews *will* have to be factually accurate. And, we *will* require you to back up any subjective comments (like "It's great!" or "It stinks!") with hard evidence as to *why* you feel that way about a given product. Our staff will be watching closely to prevent irresponsible and unwarranted attacks on any product.

In any review you submit, state what your relationship, if any, is to the maker and/or seller of the product in question. Makers and sellers of given products will *not* be permitted to post reviews of their own products. They will, in some cases, be permitted to post comments about competing products, but only on the condition that their comments are preceded by a statement making it quite clear that they are the maker or seller of a competing product. We will experiment with this because often the designer of one product is uniquely qualified to analyze designs of other similar products.

- Replies to RAINBOW

This is reserved for those who wish to expand on or take issue with any product reviews in RAINBOW. Reviews are always subjective to some extent, and in the past some lively discussions have appeared in our forum, generated by folks differing with printed RAINBOW reviews. In all cases, the name of the product, the review, the author of the review, the issue of RAINBOW in which the review appeared and the page number will have to be stated in the first paragraph of any submissions. This will be a kind of online "Reviewing Reviews."

- Producers' Comments

This subtopic is for use exclusively by makers and sellers of material commented on in other subtopics within this section. Designers and sellers of material discussed elsewhere in this section will be specifically invited to reply.

- New Product Announcements

This is for makers of CoCo products to post descriptions of their products. Authors of submissions will be required to state just what their relationship (if any) to the product is (seller, designer, beta tester, etc). Note that even those *not* officially associated with the development or distribution of a new product are invited to post new product announcements. For example, I intend to post a description of the new Microworks DS-69A digitizer, a prototype of which I saw demonstrated at Microwork's lab recently. As we know, new Tandy products often appear in one part of the country long before they appear elsewhere. Thus, we would also like to see this subtopic used by members to tell the rest of us about new Tandy stuff that has appeared in their area.

- Bulletins

Reserved for CoCo news that is not specifically related to a given CoCo product or products.

- Threads

In the past we have had some lively discussions of new and old products in the forum. From time to time the SIGops may choose to edit some of these discussions and post them in this subsection so new subscribers to Delphi can have the benefit of easily reviewing those old debates.

We expect this new section to become one of the most lively and controversial sections within our database. If used with proper respect for others, this section can become one of the most valuable for our members — users and producers alike. It is a section I have always dreamed of running.

"Mischief, thou are afoot! Take thou what course thy wilt." — Shakespeare

File Extensions and Posting Conventions

In order to help facilitate recognizing what sort of files are in the database, I would like to introduce you to a list of suggested extensions for files you submit. A file extension is the group of three letters that follows the filename. For `FILENAME.EXT`, "EXT" is the three-letter extension.

Delphi offers some substantial advantages over older information services in that you can assign *a filename of up to 32 letters*, allowing for the name to be vastly more descriptive than the cryptic six- or eight-letter filenames allowed elsewhere. To further aid prospective downloaders, we have established the following conventions for assigning extentions:

.BIN — This is used for binary files of ML programs and for binary data (graphics images posted in binary form, for example).

.BAS — This is used for BASIC programs posted in ASCII form. Please, wherever possible, post BASIC programs in ASCII form, so as to allow folks with older, non-XMODEM supporting terminal programs to have a chance at downloading the program. Please refrain from using "compressed" or "tokenized" BASIC file format. To create an ASCII-type BASIC file, load your BASIC program into the CoCo's memory, then save it using the command `SAVE "FILENAME",A`. The ",A" part of that command causes the file to be saved out in ASCII format. Note that `CSAVE "FILENAME",A` also works for tape systems. Wherever possible, we do urge the use of XMODEM file transfer protocol to upload such ASCII BASIC files.

.SRC — Use this on ASCII assembly language SOURCE files you upload to us.

.DOC — Use this on ASCII files that are written documentation for using another program.

.PIX — Use this extension on ASCII *Graphicom* and other single-frame size graphics images you upload to the database if they have been put into *PIXCMP* file format.

.CMX — Use on ASCII *CoCo Max* and other double-size graphics images that you have put into *CMXCMP* file format.

.TXT — Use for all other ASCII files that are *not* .SRC, .BAS, .DOC, .PIX or .CMX

.TOK — This extension will be used quite rarely, and usually only by advanced hackers. It is reserved for files that are uploaded in compressed ("tokenized") BASIC format.

In a few strange cases, a BASIC file cannot be uploaded as an ASCII file. This is sometimes the case with "end-packed" BASIC programs that contain "hidden" ML programs. For those very few cases where a file *must* be uploaded as tokenized BASIC, use the extension .TOK. Note that after downloading with XMODEM but before running end-packed BASIC programs, you will have to alter the end of program pointer to get such programs to run correctly.

In general, please contact me in the CoCo SIG Forum or via Delphi MAIL before submitting any tokenized BASIC program. Where at all possible, please try to use techniques of including ML code in BASIC (such as using `DATA` statements that get poked into memory) that are compatible with putting the whole program into ASCII format.

As you can see, a lot of changes are in the works. We expect our Delphi CoCo SIG database, formerly a relatively empty and sleepy place, will start buzzing with activity and bulging with interesting files of all kinds for you to download. Catch you all on the Delphi CoCo SIG!

the magazine on which the actual program listing is.

With this in mind, if you wanted to find the "Education Notes" program from the February 1986 issue, you would type:

```
READ 2/86 134 Education Notes
```

Keep in mind that the date and page number make the item unique so you could just as easily type only:

```
READ 2/86 134
```

You do not need the name of the program. As another example, suppose we wanted to find the disk utility on Page 96 of the same issue. We just type:

```
READ 2/86  96
```

Note that there are two spaces between the date and the page number. We hope this clears up any confusion in this matter.

Any Tips?

We at THE RAINBOW are always searching for hints or tips for RAINBOW readers and CoCo SIG members. Authors of any previously unpublished hints are welcome to send them to me (RAINBOWMAG) via Delphi MAIL. Authors of original hints will receive $10 upon publication in THE RAINBOW. This offer is good for the first publication only. All submitted material becomes the property of Falsoft, Inc.

Uploads

Now to thank those users who share their wares with other members of the CoCo Community. The following people have recently submitted programs to the database section of our SIG.

Marty Goodman, MARTYGOODMAN, *DBASE-CHANGES#1.TXT*, this text file discusses changes in the database area.

William Borie, DISKBANK, *Pac redial*, an RS-232 Pak redial program.

John Phelps, SPCMAN, *Dman5*, an update to the continuing saga of the disk manager.

Ken Schunk, KENSCHUNK, *DMP110.DRV*, a printer driver.

Stephen Macri, DRACMAN, *GOLF.BAS*, a text version of the sport.

Donald A. Turowski, PACRUISER, *INTROCOM.BAS*, an introduction to computers.

Printer Delights

Penumbral Prints

16K
ECB

By David S. FitzSimmons

The following graphics screen dump programs are for use with the Gemini-10X printer or any other similar printer. The programs create 8½ by 11-inch pictures and outputs at any Baud rate.

Listing 1 prints a black-and-white picture of the graphics screen. Before printing, check to find the color code number of the picture background color (green is 1, yellow is 2, blue is 3, red is 4). To do so, type the following:

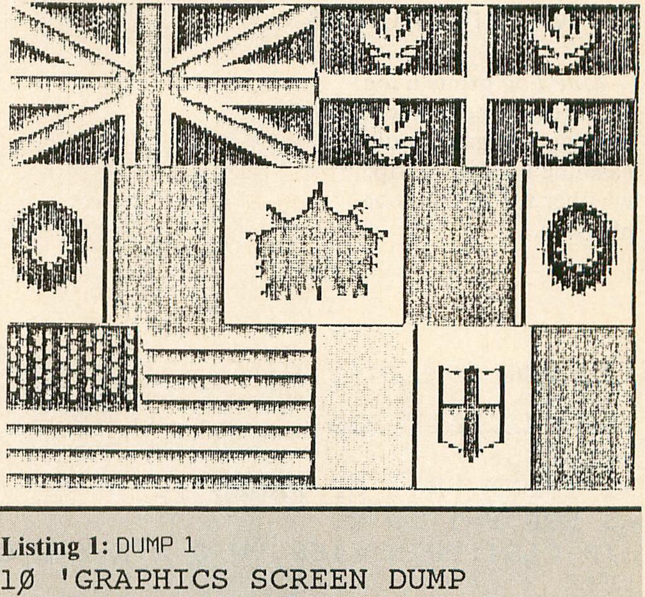
```
PMODE 3,1:SCREEN1,0:
FORT=1TO100000:NEXTT
```

Press the BREAK key once you have determined the number. Change the value of 'C' in Line 100 to whatever color code number represents the background color. The '1' of `PMODE3,1` in the previous command may need to be changed depending on what graphics page the picture appears. If it appears in a different page, change the number in the program also.

Listing 2 prints a picture using four different shadings: white, light gray, dark gray and black. The different shades give a better representation of the picture's true color.

Before loading either program, make sure the graphics screen is in memory. The programs print pictures from any graphics PMODE 0-4. However, due to the graphics handling techniques of the CoCo and the constraints of these programs, some pictures in PMODEs other than PMODE 3 or 4 may appear distorted. Try experimenting with each picture.

Sample Screen Dump



Listing 1: DUMP 1

```
10 'GRAPHICS SCREEN DUMP
20 'DAVID FITZSIMMONS
30 'RT#1, BOX 492
40 'LUCAS, OH  44843
50 DIMG(15):FORT=1TO15:READG(T):
NEXTT
60 PMODE3,1:SCREEN1,0
70 PRINT#-2,CHR$(27);CHR$(66);CH
R$(2);CHR$(27);CHR$(65);CHR$(6);
80 FORTT=255TO0STEP-2
90 FORT=0TO191STEP2
100 X=224:A=0:C=1
110 IFPPOINT(TT,T)<>C THENA=A+1
120 IFPPOINT(TT,T+1)<>C THENA=A+
2
```

```
130 IFPPOINT(TT-1,T)<>C THENA=A+
4
140 IFPPOINT(TT-1,T+1)<>C THENA=
A+8
150 FORF=1TO15
160 IFA=F THENX=G(F)
170 NEXTF
180 PRINT#-2,CHR$(X);
190 NEXTT
200 PRINT#-2,CHR$(13);:NEXTTT
210 DATA225,227,231,226,233,230,
235,228,229,234,236,232,237,238,
239
```

Listing 2: DUMP 2

```
10 'GRAPHICS SCREEN DUMP
20 'DAVID FITZSIMMONS
30 'RT#1, BOX 492
40 'LUCAS, OH  44843
50 DIMF(20)
60 FORT=1TO20
70 READF(T)
80 NEXT
90 PMODE3,1:SCREEN1,0
100 PRINT#-2,CHR$(27);CHR$(56);
110 PRINT#-2,CHR$(27);CHR$(77);C
HR$(0);CHR$(27);CHR$(65);CHR$(3)
;
120 FORP=255TO0STEP-1
130 PRINT#-2,CHR$(27);"L";CHR$(1
92);CHR$(3);
140 FORY=0TO191:A=PPOINT(P,Y):PR
INT#-2,CHR$(F(A*5-4));CHR$(F(A*5
-3));CHR$(F(A*5-2));CHR$(F(A*5-1
));CHR$(F(A*5));:NEXTY
150 PRINT#-2
160 NEXTP
170 DATA 64,0,0,160,0,0,0,0,0,0,
224,224,224,224,224,160,64,160,6
4,160
```

Trip Tallying

By Malvin Thomas

16K

Mile Log prints a log sheet for keeping track of mileage and gallons of gasoline used on a trip, whether for business or pleasure.

Sample Printout

```
DATE :- - - - - - - - - - - - - - -
MILES END OF DAY: - - - - - - - - -
MILES START OF DAY: - - - - - - - -
  TOTAL MILES :- - - - - - -  - - -

GAS,NO. OF GALLONS: - - - - - - - -
MILES PER GALLON :  - - - - - - - -
```

The listing: MILE LOG

```
0 ' MILEAGE LOG
1 CLS3
2 INPUT "NO. OF PAGES";C
3 FOR P=1 TO C
10 CLS4:PRINT@168,"W O R K I N G
";
20 PRINT#-2,"":PRINT#-2,""
40 FOR X=1 TO 7
50 K=2:L=K+L
60 PRINT#-2,""
70 PRINT#-2,"DATE :- - - - - - -
 - - - - - - - - -  : DATE :- - -
- - - - - - - - - - - - - - -"
80 PRINT#-2,"MILES END OF DAY: -
 - - - - - - - - -  : MILES END OF
 DAY: - - - - - - - - - - - "
90 PRINT#-2,"MILES START OF DAY:
 - - - - - - - - -  : MILES START
OF DAY: - - - - - - - - - - - "
100 PRINT#-2,"  TOTAL MILES :- -
 - - - - - - - - -  :  TOTAL MILE
S- - - - - - - - - - - - - -"
110 PRINT#-2,""
120 PRINT#-2,"GAS,NO. OF GALLONS
: - - - - - - - - -  : GAS, NO. OF
 GALLONS: - - - - - - - - - -"
130 PRINT#-2,"MILES PER GALLON :
  - - - - - - - - -  : MILES PER G
ALLON : - - - - - - - - - - -"
140 PRINT#-2,". . . . . . . . .
. . . . . . . . . . . . . . . .
. . . . . . . . . . . . ."
150 PRINT@264,"NO. "L" DONE";
160 NEXT X
170 PRINT#-2,""
175 NEXT P
180 PRINT@324,"* * DONE WORKING
* * ";
190 GOTO 190
```

Easy as A-B-C

16K
Disk

By Ralph D. Miller

The following program alphabetizes a list of items and displays them to the screen or printer. The amount of memory available determines how large the list of input items can be.

To make a cassette version, delete everything after the quote (″) following `BASIC?″` in Line 300, delete the `AND D$< >″M″` in Line 310 and delete Line 325. To change the Baud rate for your system, alter Line 3.

The listing: `ALPHITIZR`

```
3 POKE 149,0:POKE150,17
4 CLS:PRINT@128," **************
**************** "
5 PRINT" * (C)1985   RALPH D. MI
LLER *"
6 PRINT" ***********************
****** "
7 PRINT@294,"all rights reserved
"
8 FOR T=1 TO 2000:NEXT T
9 N=0:A=0:B=0:X=0
10 CLS:INPUT"HOW MANY ITEMS?";N
20 DIM A$(N+14)
30 FOR A=1 TO N
40 PRINT"#";A;
50 INPUT A$(A)
60 NEXT A
65 A=A-1
70 CLS:PRINT@42,"SORTING"
80 FOR A=1 TO N
90 FOR B=A+1 TO N
100 IF A$(B)<=A$(A) THEN CD$=A$(
B):A$(B)=A$(A):A$(A)=CD$
110 NEXT B
120 NEXT A
130 PRINT@104,"DONE SORTING"
132 PRINT@297,"OUTPUT TO:"CHR$(1
3)CHR$(13)"          pRINTER"CHR
$(13)"             OR"CHR$(13)"
       sCREEN"
134 C$=INKEY$:IF C$="" THEN 134
135 IF C$="P" THEN X=3
140 A$(N)=A$(N+1):A$(N+1)=""
158 CLS
200 FOR A=1 TO N STEP 14
210 FOR B=A TO A+13
220 IF X=3 THEN 250
230 PRINT A$(B)
240 GOTO 260
250 PRINT#-2,A$(B)
260 NEXT B
265 IF X=3 THEN GOSUB 350:GOTO 2
80
270 PRINT@480,"          strike sp
acebar";:D$=INKEY$:IF D$="" THEN
 270
275 CLS
280 NEXT A
290 PRINT@480,"          strike sp
acebar";:D$=INKEY$:IF D$="" THEN
 290
300 CLS:PRINT@136,"rUN AGAIN?"CH
R$(13)"        cOLD START BASIC?
"CHR$(13)"            OR"CHR$(13
)"      mAIN DISK MENU?"
310 D$=INKEY$:IF D$<>"R" AND D$<
>"C" AND D$<>"M" THEN 310
320 IF D$="R" THEN RUN9
325 IF D$="M" THEN LOAD"DIRECTRY
",R
330 POKE&H71,0:EXEC&HA027
350 PRINT@200,"printing..."
360 RETURN
```

Okidata Dumps

16K
ECB

By Scott Humphries

The following programs take any picture in `PMODE4` in the CoCo's memory and convert it to the Okidata printer's graphics code, printing black as black and white as white. To print black as white and white as black, change the = in lines 40 through 90 to >.

Hardcop1 is a slow version of the program that does not use the high speed `POKE`. It analyzes and prints the graphics simultaneously. *Hardcop2* is a faster version that first analyzes the graphics and then prints them.

Listing 1: `HARDCOP1`

```
1 PMODE4,1:SCREEN1,1
5 PRINT #-2,CHR$(29)CHR$(14)CHR$
(27)CHR$(56);
10 FORI=0TO191STEP3
20 FORX=0TO256STEP2
30 A=0
40 IFPPOINT(X,I)>0THENA=A+1
50 IFPPOINT(X+1,I)>0THENA=A+2
60 IFPPOINT(X,I+1)>0THENA=A+4
```

```
70 IFPPOINT(X+1,I+1)>0THENA=A+8
80 IFPPOINT(X,I+2)>0THENA=A+16
90 IFPPOINT(X+1,I+2)>0THENA=A+32
100 IFA>=32THENPRINT#-2,CHR$(A);
:ELSEPRINT#-2,CHR$(64+A);
110 NEXTX:PRINT#-2,CHR$(13);:NEX
TI
120 PRINT#-2,CHR$(30)CHR$(15)CHR
$(27)CHR$(54)CHR$(12);
130 END
```

Listing 2: HARDCOP2

```
1 PMODE4,1:SCREEN1,1
2 CLEAR10000:DIMK$(66)
4 K=1
5 PRINT #-2,CHR$(29)CHR$(14)CHR$
(27)CHR$(56);
6 POKE65495,0
10 FORI=0TO191STEP3
20 FORX=0TO256STEP2
30 A=0
40 IFPPOINT(X,I)=0THENA=A+1
50 IFPPOINT(X+1,I)=0THENA=A+2
60 IFPPOINT(X,I+1)=0THENA=A+4
70 IFPPOINT(X+1,I+1)=0THENA=A+8
80 IFPPOINT(X,I+2)=0THENA=A+16
90 IFPPOINT(X+1,I+2)=0THENA=A+32
100 IFA>=32THENK$(K)=K$(K)+CHR$(
A) ELSE K$(K)=K$(K)+CHR$(64+A)
110 NEXTX:K$(K)=K$(K)+CHR$(13):K
=K+1:NEXT I
111 POKE65494,0
115 FOR I=1 TO 64:PRINT#-2,K$(I)
;:NEXT I
120 PRINT#-2,CHR$(30)CHR$(15)CHR
$(27)CHR$(54)CHR$(12);
130 END
```

16K

Fancy Formatter

By Dale A. Kuhn

Printmat is a utility to list a program or an ASCII file to the printer in the same format as it appears on the screen. It prints any desired line length (up to the maximum line length of the printer) and puts any number of spaces between lines for better legibility.

The listing: PRINTMAT

```
10 CLEAR500:'PRINTMAT BY DALE A.
 KUHN (C) 1985
20 CLS:INPUT"NUMBER OF CHARS/LIN
E";CL:INPUT"NUMBER OF SPACES TO
SKIP BETWEENLINES";Y:INPUT"POSIT
ION CASSETTE TAPE BEGINNINGOF FI
LE AND DEPRESS PLAY - <TYPE ENTER
 WHEN READY>";T:INPUT"NAME OF FI
LE     (FILE MUST ASCIIFORMAT)";N
$:F=1:OPEN"I",#-1,N$:YY=Y
30 INPUT"IF PRINTER IS ON AND PO
SITIONED TO TOP OF PAGE TYPE ENT
ER";T
40 INPUT#-1,A$
50 IFYY>0THENPRINT#-2,"":YY=YY-1
:GOTO50ELSEYY=Y:X=LEN(A$):IFEOF(
-1)THENF=0:IFX=0THEN90ELSE80
60 IFX=0THEN40ELSEIFX<=CL THEN80
70 N=1:FORJ=1TOINT(X/CL+1):PRINT
#-2,MID$(A$,N,CL):N=N+CL:NEXTJ:I
FF=1THEN40ELSE90
80 PRINT#-2,A$:IFF=1THEN40ELSE90
90 CLOSE#-1:CLS:END
```

16K
ECB

Around the World in 60 Days

By Roger Miller

Vacation Planner prints out day-to-day events that can be referred to while traveling so you don't miss anything on your agenda. The program allows up to 60 days of planning, but if you want to change this to a larger number of days, then change the 60 in the `FOR/NEXT` loop in Line 110 to the desired number.

Vacation Planner is designed for a DMP-120 printer, but can be altered for use with other printers. A list of the line numbers that contain printer codes is as follows:

Line	Function
40	Poke for 1200 Baud printer speed
210	Extended type mode
250	End extended type mode
270	Begin underline
320	End underline

Sample Printout

```
****************************************

              Grand Canyon

****************************************
                                                                          TRAVEL
DAY                                 AGENDA                                 TIME    MILES


Mon         Drive to Bakersfield, relax and spend night                    5.5     294
Tue         Drive to Vegas, sign in at Circus, dinner & show               5.5     290
Wed         Drive to Zion, set camp, sightseeing & campfire                2.3     122
Thu         Visitor's center & hiking, sightseeing & campfire              0       0
Fri         Drive to Bryce, set camp, sights and scenic drive              2.5     100
Sat         4:30am hike into canyon                                        0       0
Sun         WHATEVER!! (sleep)                                             0       0
```

The listing: VACATION

```
10 REM   VACATION PLANNER
20 DIM D$(60),AG$(60),TT$(60),M$
(60)
30 CLEAR 5000
40 POKE 150,41
50 CLS
60 PRINT@136,"VACATION PLANNER
70 PRINT@198,"BY ROGER MILLER 19
85
80 FOR X=1 TO 1500:NEXT
90 CLS:PRINT"ANSWER THE QUESTION
S AND WHEN   YOU ARE FINISHED TY
PE <END>.    YOU HAVE 60 DAYS MA
XIMUM FOR    YOUR TRIP.
100 LINE INPUT"NAME OF THIS VACA
TION? ";A$
110 FOR X=1 TO 60
120 LINE INPUT"DAY OF WEEK? ";D$
(X)
130 IF D$(X)="END" THEN GOTO 210
140 LINE INPUT"AGENDA FOR THE DA
Y? ";AG$(X)
150 IF AG$(X)="END" THEN 210
160 LINE INPUT"TRAVEL TIME? (IN
HOURS) ";TT$(X)
170 IF TT$(X)="END" THEN 210
180 LINE INPUT"DISTANCE? (IN MIL
ES) ";M$(X)
190 IF M$(X)="END" THEN 210
200 NEXT X
210 PRINT#-2,CHR$(27)CHR$(14)
220 FOR Z=1 TO 40:PRINT#-2,"*";:
NEXT Z
230 PRINT#-2,TAB(60-LEN(A$)/2)A$
235 PRINT#-2
240 FOR Z=1 TO 40:PRINT#-2,"*";:
NEXT Z
250 PRINT#-2,CHR$(27)CHR$(15)
260 PRINT#-2,TAB(66)"TRAVEL"
270 PRINT#-2,CHR$(015);
290 PRINT#-2,"DAY
           AGENDA
                TIME    MILES"
320 PRINT#-2,CHR$(014)
330 FOR Y=1 TO X-1
340 PRINT#-2
345 S$=D$(Y):U=9:GOSUB1000
350 PRINT#-2,S$;
355 S$=AG$(Y):U=51:GOSUB1000
360 PRINT#-2,TAB(3)S$;
365 S$=TT$(Y):U=6:GOSUB1000
370 PRINT#-2, TAB(3)S$;
375 S$=M$(Y):U=5:GOSUB1000
380 PRINT#-2,TAB(3)S$;
390 NEXT Y
400 CLS:PRINT"PRESS <C> TO CONTI
NUE
410 PRINT:PRINT"PRESS <P> FOR AN
OTHER HARD COPY
420 PRINT:PRINT"PRESS <Q> TO QUI
T
430 Z$=INKEY$
440 IF Z$="" THEN 430
450 IF Z$="C" THEN 120
460 IF Z$="P" THEN 210
470 IF Z$="Q" THEN END
1000 S=LEN(S$)
1010 U=U-S
1020 FORG=1 TO U
1030 S$=S$+" "
1040 NEXTG
1050 RETURN
```

TURN OF THE SCREW

Expanding the theory and understanding the concept of memory . . .

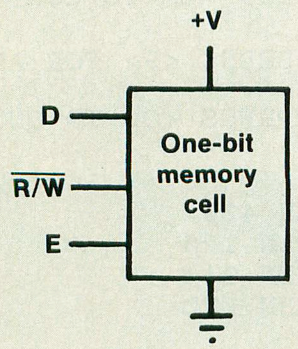
Exploring Memory Cells

By Tony DiStefano
Rainbow Contributing Editor

Last time we looked at how a few flip-flops and gates added up to make a memory cell. A memory cell can also be part of a bigger block of memory cells. This time, I'll expand on the theory of memory cells and describe in detail the concept of memory mapping, chip select, data and address buses.

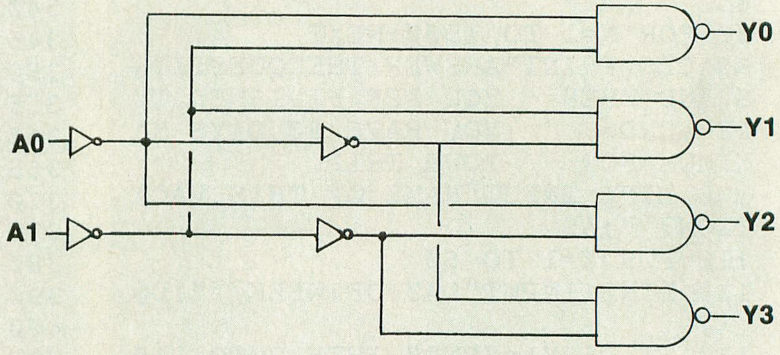
Let's start back at the one-cell memory bit. Figure 1a shows the block diagram of a one-bit by one-bit memory chip. This chip does not exist on the market; it is too simple. It would take thousands of these chips along with thousands of wires to make a decent amount of memory. Today there are static memory chips that have 8K by 8 bits wide in one 28-pin DIP (Dual Inline Package) and dynamic memory chips pushing one megabit (that's one million bits).

Figure 1a



Tony DiStefano is well-known as an early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.

Figure 1b



It's time for some theory. Remember when I described the binary number system? This is where it comes in handy. Let's look at two binary bits to start with. Two binary bits have four different combinations: 00, 01, 10, 11. Figure 1b shows a circuit that has two inputs and four outputs. This type of circuit is known as a decoder. There are decoders with two-, three- and four-bit inputs. More about this later. For now, two bits will prove my point. Look again at Figure 1b. When A0 and A1 (on the input side) are both low, Y0 (on the output side) is low and the other three are high. When A0 is low and A1 is high, Y1 is low. When A0 is high and A1 is low, Y2 is low. And finally, a 1 on both A0 an A1 produces a low on Y3. If you look at the truth table for this circuit

Figure 1c

INPUTS			OUTPUTS			
$\overline{OE}$	A0	A1	Y0	Y1	Y2	Y3
0	0	0	0	1	1	1
0	0	1	1	0	1	1
0	1	0	1	1	0	1
0	1	1	1	1	1	0
1	X	X	1	1	1	1

(Figure 1c), notice that binary counting and individual outputs are related.

I hope by now you are starting to understand Hex and binary relations because they get more important as we go along. Figure 1d shows the block diagram of this two-to-four decoder. The other line in our decoder (Figure 1d only) is an input. The name of this line is Output Enable, $\overline{\text{OE}}$ for short. When this line is low, all of the preceding is true, but when this is high, the outputs Y0 to Y3 never go low. It can also be known as a Chip Select if it is connected to the right gates.

Figure 1d

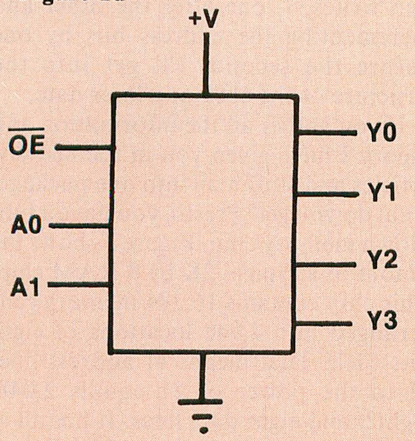
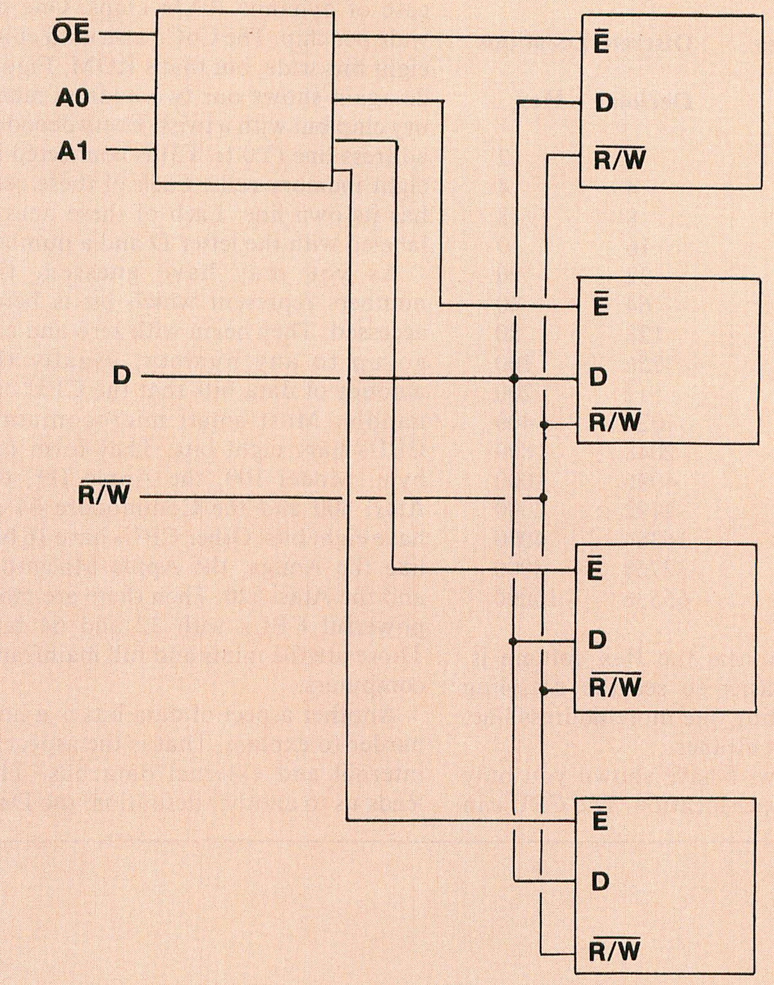


Figure 2a shows how the decoder and our one-bit memory cell go hand-in-hand. One thing to notice is the decoder inputs are labeled A0 and A1. There is a good reason for using the letter A. In this case and almost all cases, the letter A, along with another number, is short for Address lines. In a computer system, there are address lines to form an address bus.

Figure 2a

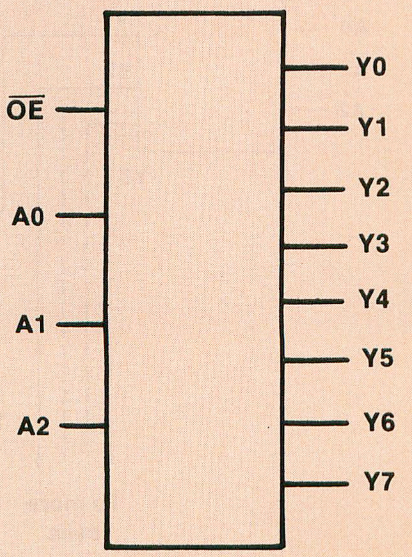


The definition of address bus is: Address lines are inputs that reflect a binary number and identify a specific position or location in a memory system. Or more plainly, when the CPU wants a specific piece of data in memory, it puts out a binary number equal to the number of the location it wants. The 6809 CPU in the CoCo can specify 65,535 different locations. If you recall, that boils down to 16 binary bits (2 to the power of 16). That is so the 6809 CPU has 16 Address lines, A0 to A15. Maybe we should get back to our two-address memory block.

To continue showing individual gates for decoding would not only be silly, it would take up enormous amounts of room in this magazine. They don't call today's chips LSI (Large Scale Integration) for nothing. A single chip can have the equivalent of a quarter of a million gates. Imagine trying to draw that many gates! It's much easier to draw block diagrams, and as long as you understand the theory behind these blocks, it makes the diagrams a lot easier to read. From now on, I will use block diagrams whenever it is not convenient to use discrete gates.

The block diagram in Figure 2b shows the same idea as Figure 1a, but with more address lines, therefore more output lines, and can thus select more flip-flop memory cells. Each time an address line is added, the number of gates needed to decode the input goes up exponentially and the amount of outputs doubles. If there are four address lines, you can access 16 different locations; if there are five address lines you can access 32 and six address lines

Figure 2b



gives access to 64. Here is a list relating the address lines to the amount of discrete locations possible:

Address Lines	**Discrete Locations**	
	Decimal	**Hex**
1	2	2
2	4	4
3	8	8
4	16	10
5	32	20
6	64	40
7	128	80
8	256	100
9	512	200
10	1024	400
11	2048	800
12	4096	1000
13	8192	2000
14	16384	4000
15	32768	8000
16	65536	10000

Look how neat the Hex column is. It's much easier to see the doubling effect of adding one more address line. It's also a lot cleaner.

Up to now, I have shown you only one data bit per location. The CPU can access eight data bits at a time. We could duplicate the circuit eight times; it was done in the past and is still done in the case of dynamic RAM chips. One bit wide per chip. The CoCo also used chips eight bits wide, but that's ROM. Figure 2c again shows our two-address memory chip but with a twist. Every decoded address line (Y0 to Y3) is connected to eight memory cells. Each of these cells has its own line. Each of these lines is labeled with the letter D and a number.

As you may have guessed, the numbers represent which bit is being accessed. They begin with zero and can go up to any number, usually the amount of data bits that the CPU can handle. Most small microcomputer CPUs have eight bits. They form one byte. Model 100, the Apple II+, the Atari 800 and the Commodore 64 all have eight bits. Other CPUs have 16 bits like the Amiga, the Apple Macintosh and the Atari 520. Then there are more powerful CPUs with 32 and 64 bits. Those are the minis and full mainframe computers.

Another aspect of data bits is a little harder to explain. That is the aspect of internal and external data bus. This leads us to another definition, the Data Bus: data lines that are bi-directional lines providing communication between discrete components in a computer system. Some CPUs have only eight data lines coming from the CPU, which is to say there are eight pins on the CPU chip, but it can handle more than eight bits internally. Usually a CPU has double the number of internal data capabilities than external. In order for the CPU to read or write double-capacity data, it must do two reads or two writes — one after the other and incrementing the address bus by one before the second. I'll get into the structure of the 6809 at a later date.

If you gather all the information and theory I have given you in the last few articles and stuff it all into one package, what do you get? Presto, you have a full-blown memory chip. Figure 3 shows the pinout of a typical 2K by 8 RAM chip. This chip contains 16,384 memory cells arranged into 2,048 locations of eight bits each. That means 11 address lines (2 to the power of 11 equals 2,048, right?) and eight data lines. It has all of the inputs and outputs that I have been describing in the last few articles. There should be no surprises. The following is a pin-by-pin description of this chip.

Figure 2c

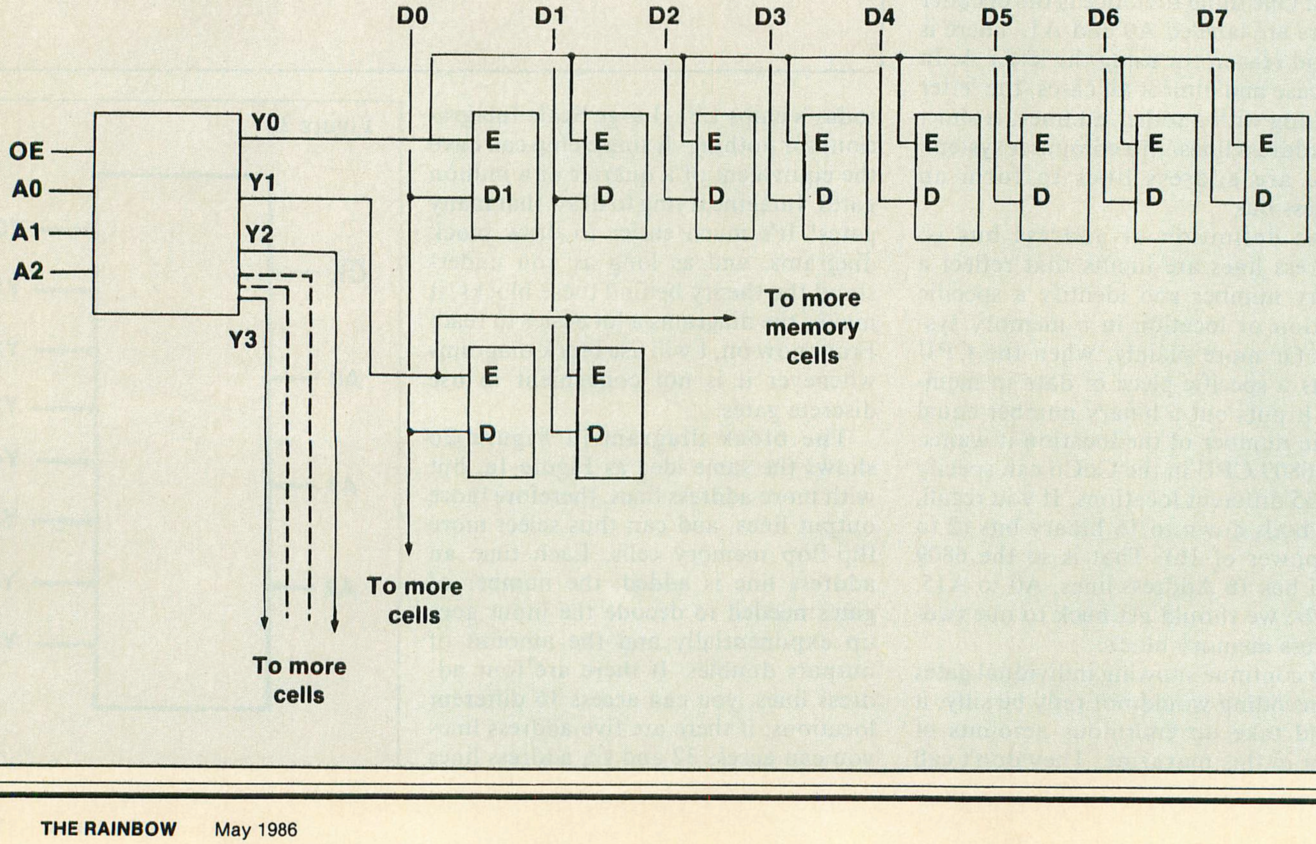
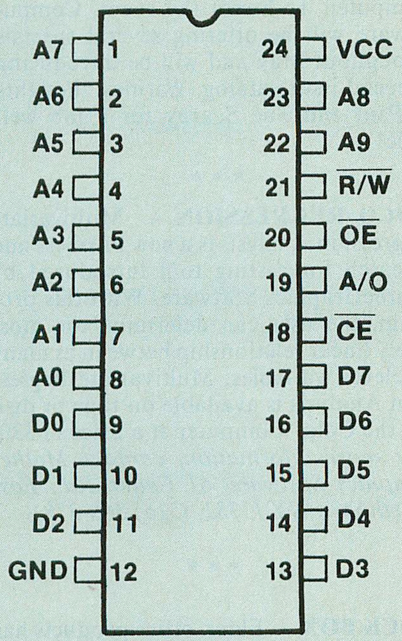


Figure 3



Typical 2K by 8 static RAM chip

A0 to A10 — These inputs only are address lines that choose which memory byte is to be selected. There are a total of 11 address lines, therefore this chip has a maximum of 2,048 ($800) bytes of memory.

D0 to D7 — These bi-directional lines form the data bus in which data can be transferred to or retrieved from the internal flip-flops.

GND — This is an electrical ground to the chip. All signal levels to the chip are with respect to this pin. Commonly known as Vss, it has a voltage potential of zero volts.

Vcc — This input supplies power to the whole chip. The voltage requirement for a typical memory chip is from three to eight volts. The current (power) requirements for a 2K memory chip can range from 10 to 100 milliamps for a regular chip and 10 to 100 microamps for a CMOS chip.

R/$\overline{\text{W}}$ — This Read/Write input determines the direction of data flow through the data lines. When this pin is high, the memory chip sends out data stored inside. This is a Read action. When it is low, the data lines enter data to the chip to be remembered. This is a Write action.

$\overline{\text{CE}}$ — This input selects the chip. When this pin is high, the chip is in the tri-state mode. The chip is inactive and the data lines are not reading or writing.

$\overline{\text{OE}}$ — This input is an Output Enable pin. If the $\overline{\text{CE}}$ pin is low and this pin is high when reading, the data is ready, but the data lines are kept in tri-state until the $\overline{\text{OE}}$ line goes low. When reading, this pin can be used as a second chip select or enable.

All of these lines in one package make up a memory chip. All computers need memory. There are a lot of different kinds of memory chips and what I described here is just one of them. But, whatever the kind of memory or the packaging material used, they are all basically (in theory) the same as the ones described. That's it for this time.

Two-Liner Contest Winner . . .

Run this program to see what the CoCo can do to entertain you. Note: Better turn up the volume for this one.

The listing:

```
0 PMODE4:PCLS0:SCREEN1,1:DRAW"BM
20,112D72R45U72L45BM192,112D72R4
5U72L45BM84,152R88F8BM84,152G8BM
72,160R112D28L112U28BM80,168R20D
12L20U12":CIRCLE(42,166),15:CIRC
LE(42,166),5:CIRCLE(214,166),15:
CIRCLE(214,166),5:CIRCLE(34,126)
,5:CIRCLE(222,126),5
1 DRAW"BM80,180E5R10F5BM108,164R
42D8L42U8BM122,164D4":CIRCLE(166
,174),6:PLAY"O3L8T4E-E-E-E-DCO2A
O3CCO2AO3EL2EP8L8E-E-CEDCO2AO3L4
CL8O2AAL4GP4P2L4O3DL8DCDCDCDDCEP
8O2L8GAGO3CCO2AO3CCO2GAG;O3L8T4C
O2AO3CCL4O2GL8O3":GOTO1
```

Mike Collett
Elfrida, AZ

(For this winning two-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Adventures* and its companion *The Second Rainbow Adventures Tape.*)

H.D.R. SOFTWARE
ENHANCE YOUR COCO!

Enhance your CoCo with THE ENHANCER. It gives you 26 user-definable "soft keys" of up to 50 characters each. It gives you upper- and lower-case characters and 128 special characters in a 32-by-24 high-res display. The Enhancer gives you Pascal-like procedures, keyboard auto-repeat and much more. The Enhancer smoothly complements your CoCo's vocabulary. It uses NO user RAM! The Enhancer requires 64K, extended BASIC and comes on disk or tape. It costs U.S. $18.00.

See review in this month's Rainbow Magazine.

TEXT PROCESSING POWER WITH TXEDIT

Why toy with other text editors? Get TXEDIT, the best word processor for the CoCo. Txedit uses the high-res screen to display true lower-case characters. It has graceful error recovery, and will retain all text even if you press RESET. It has powerful embedded formatting commands, including headers, footers, vertical and horizontal margins, page numbering, centering, right-justification, double-spaced printing, and any "special effects" your printer can handle. TXEDIT has a huge 47K text buffer. It is totally command-driven and user friendly — no more wading through endless menus. An online help screen is available to assist you. TXEDIT is lightning fast — it requires no slow disk "overlays." It takes less than 3 seconds to find a word at the end of a 17-page document! TXEDIT will work on a 64K CoCo with Radio Shack Disk BASIC (any version) and costs U.S. $44.95.

The Enhancer	Disk or Tape, 64K	$18.00
TXEDIT	Disk only, 64K	$44.95

To order, send a cheque or money order to:
H.D.R. Software
27 Doyle Street
St. John's, NF
CANADA A1E 2N9 Tel. (709) 364-3125

PIPELINE

TERMINAL PACKAGE — Now available on the CompuServe CoCo SIG is a terminal program that accepts CompuServe's 'B' protocol for file handling. A.B. "Sandy" Trevor has altered the "dumb" terminal program, *DTE*, for this capability. *DTE*, which is intended for OS-9 systems, is available for downloading in two forms: 1) C source code, and 2) as a binary file. The package has been modified to run with the PBJ 2SP serial port and the Deluxe RS-232 Pak. It can be downloaded from either the CCSIG or the OS-9 SIG.

* * *

TAKE A STRONG STAND — Bretford Manufacturing Inc. has announced that their mini printer stands now have a new twist. The edges of the one-piece metal stands have been rolled to increase their stability. The WSPS1 is designed for 80-column printers and retails for $22. The WSPS2 is intended for use with larger 132-column printers and retails for $31. Both units have slots for bottom-feed printers. *For more information, contact Bretford Manufacturing Inc., 9715 Soreng Ave., Schiller Park, IL 60176, (312) 678-2545.*

* * *

TOP SELLERS — Manna Computing Concepts has announced publication of the Christian software *Top Ten Best Sellers for 1985*. The list includes, among other items, two programs for the CoCo. *Bible Books* is a package that tests your knowledge of the 66 books of the Bible. *Batter Up* is a takeoff on baseball; miss a question and "yer out!" *For further information, contact Manna Computing Concepts, Box 527, Dept. P, Woodstock, GA 30188, (404) 928-8111.*

* * *

HEAVYWEIGHT PRINTER — If you are using your Color Computer for industrial applications, you may be interested in the Syntest industrial printer. The 80-column, 130 cps SP-2010 Printer features a belt drive for perfect dot alignment and increased mean-time between failures. It has internal graphics and fonts, and includes a 7K buffer for increased throughput. Several standard interfaces, including RS-232C and Centronics, may be used with the SP-2010, which retails for $985. *For more information, contact Syntest, 40 Locke Dr., Marlboro, MA 01752.*

* * *

NEW PRICE! — Morrison & Dempsey Communications has announced a reduction in price for the SmarTEAM™ 103/212A modem. The new price for this 300/1200 Baud modem is $300. This modem, which is manufactured by Team Technology Inc., is guaranteed to be 100 percent compatible with the Hayes Smartmodem® 1200 and includes a two-year warranty. *The modem is distributed in the U.S. by Morrison & Dempsey Communications, 19209 Parthenia, Unit D, Northridge, CA 91324, (818) 993-0195.*

* * *

FAST DOT-MATRIX — C. Itoh has introduced the C-310, a personal printer capable of speeds up to 300 cps in draft mode. The 80-column printer also features a 50 cps near-letter quality and produces letter quality printing at 28 cps. The C-310 includes a variety of resident character fonts, a semi-automatic paper loader and an eight-bit parallel interface. Suggested retail price is $599. *For more information, contact C. Itoh Digital Products, 19750 South Vermont Ave., Suite 220, Torrance, CA 90502.*

* * *

HALL OF FAMER — Tandy Corporation/Radio Shack has received the Consumers Digest Hall of Fame Award for meritorious service in the national retail market. The award recognizes Tandy for "marketing its line of technologically advanced Tandy® computers at competitive prices, while maintaining one of the most extensive dealer/service networks in the country."

* * *

CONGRATULATIONS — The month of May marks the 10th anniversary of Computerware. This California-based supplier of CoCo wares was started as a reaction to poor service in the computer market of the mid-1970s. The company began dealing with the 6800 family of microprocessors and quickly moved up to the 6809 with the advent of the Color Computer. To honor the event, Computerware will be offering several specials throughout May and will be introducing a special-issue catalog. Warmest thoughts to Paul and Sue Searby for a job well done!

* * *

COCO REGRESSION — Multivariate Regression Analysis is a new business and research forecasting tool introduced by MatheGraphics Software. With this program, the user can determine the most likely linear relationship between as many as eleven variables. Multivariate Regression Analysis is available on tape or disk for the Color Computer at a price of $30. *For more information, contact MatheGraphics Software, 61 Cedar Rd., East Northport, NY 11731, (516) 368-3781.*

* * *

LOCK BOX — Eldon office products has announced the Combo File with Lock for storage of diskettes, cassettes and data cartridges. The unit will accommodate up to four cartridges and thirty-five 5¼-inch diskettes and includes removable plastic dividers. Other features include a hinged cover and a non-magnetic lock for improved data integrity. Suggested list price is $24.98. *Contact Eldon Office Products, Dept. SP, 1130 East 230th Street, Carson, CA 90745, (213) 518-1600.*

* * *

CIS/MCI LINKUP — CompuServe Incorporated and MCI Communications Corporation announced the interconnection of their electronic mail services. The interconnection allows subscribers to the two companies' electronic mail systems to communicate with each other instantaneously. Subscribers of either company's service can create and send messages to subscribers on either network using the same methods and commands with which they are already familiar.

* * *

FREE OFFER — Bob Albrecht has announced a "savings plan" for RAINBOW readers. Bob will send a three-issue subscription to *DragonSmoke* to the first 100 people who request a free subscription in writing and identify themselves as RAINBOW readers. *DragonSmoke* is a periodical focusing on IBM PC compatibles, the Tandy 100 and 200 and the CoCo. *Send your request to DragonQuest, P.O. Box 7627, Menlo Park, CA 94026.*

* * *

256K SUPER RAM 512K

HOME RUN!

- 256K Bd - $129.95
- 512K Bd - $169.95

(Requires RS Multi-Pak)

OS-9 DRIVER $24.95

The first 256K/512K memory bd for the CoCo II ! Inside this low noise metal case lives 256K/512K of memory and all the circuitry to access it as a RAMDISK ! The CoCo II answer to THUNDER RAM is here - NOW !!!

SPECTRUM STRIKES BACK !!! AGAIN !!!

SUPER RAM - The HIT of the Rainbow Fest in Palo Alto, CA !

256K THUNDER RAM 256K

STRIKE 1 - RAM!

Easy installation, software and tech information!
(NOT available for CoCo II's)

OS-9 DRIVER $24.95

The first 256K memory Bd for the CoCo! Load four 32K pgms at once, emulate a 40trk RAMDISK, 60K Print Spooler, FAST access, 30+ Hi-Res screens in memory!! $99.95 (see Sept '85 Rainbow Review)

DOUBLE RAM - Upgrades a THUNDER RAM from 256K to 512K giving TWO independent RAM Disks! $79.95

NEW VERSION COCO MAX II NEW VERSION

STRIKE 3 - A HIT!

Feature packed hardware & software Graphics System! Includes: Pull-Down Menus, Icon processing, multiple Font styles, full graphic editing plus a special Input Module for 256x192 joystick input.

64K DISK $79.95 w/Y-Cable $99.95
Requires Multi-Pak or Y-Cable ($29.95)
CoCo Max I - II Disk Upgrade - $19.95
CoCo Max (TAPE) $69.95 Mouse Pad $14.95

SUPER CONTROLLER

STRIKE 2 - DOS!

Uses 2764 ($6.95) or 27128 ($14.95) EPROMS !

EPROM Programmer ↓ $59.95 ↓
(Requires Super Controller)

The most AMAZING CoCo Disk Controller ever! Switch up to 4 DOS's (up to 16K) via a single software POKE! Choose between R/S 1.0/1.1, Spectrum DOS, ADOS, JDOS, Stearman DOS - $99.95

CDOS 3.2 $19.95 and/or Spectrum DOS $29.95 (27128 EPROM) with purchase of Super Controller

Enhanced Display 80 - Add an 80x24 display, Real Time Clock & Centronics Parallel Printer interface to your Super Controller ! Includes SMOOTH SCROLLING & Switchable Video Input !! $129.95

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COD Order Line 718-441-2807

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SPECTRUM PROJECTS

SOFT AND HARD WARES FOR COLORFUL COMPUTING

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COMMUNICATION

COLORCOM/E - A complete smart terminal package! Upload, Download, Hi-Res (51X24) screen, 300/1200 Baud, Offline Printing. 32/64K Disk* - $39.95
*- Now with DELPHI & Compuserve XMODEM support! Download ML!
COMPUSERVE 5hr Start Kit $29.95

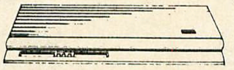
SAVE $20 ! Get CC/E TW-64 TELEPATCH for only $99.95

WORD PROCESSING

TELEWRITER-64 - Three Hi-Res screens, true lowercase char's right justify, full screen editor. Tape $49.95 Disk $59.95
TELEPATCH - A TW-64 enhancer!!! True block move, Overstrike & TSPOOL mode, Type Ahead Buffer FASTER Disk I/O 64K Disk $19.95

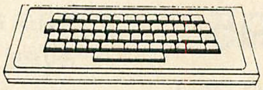
BUY BOTH → SAVE $10

MODEMS

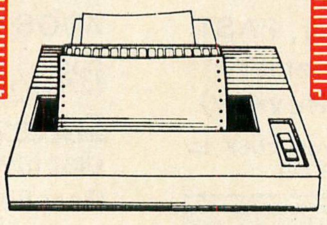


MINI-MODEM - Direct connect, 300 Baud, Orig/Answer- $39.95**
J-CAT Modem - Lowest priced auto/answer modem - $119.95
HAYES SM300 - "Programmable" auto-dial/auto answer-$169.95**
Hayes"CLONE"1200 Baud-$199.95**
** - Add $12.95 for Modem Cable

PRINTERS



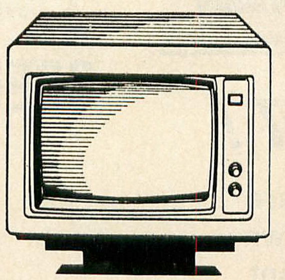
GEMINI SG-10 - 120 cps w/true descenders, 2K buffer, tract-frict feed, Near Letter Quality mode, 1 Yr. warranty! - $239.95
BriteFace-The first INTELLIGENT Parallel Ptr Interface for CoCo Auto set Baud rates from 600 to 9600/NO switches to turn $59.95



KEYBOARDS

HJL-57 - Save $7.00 !! - $72.95
HJL NumberJack Keypad - $79.95
-Specify Model/Revision Board-
CoCo Keybd Software - Finally! An ENHANCED Function Key Pgm! 4 most wanted features: 9600 Baud Poke, Text Screen Dump, Line Listing & Cold Start-DSK $14.95

MONITORS



Monitor Stand $24.95

MONOCHROME Monitors - CRISP 80x24 Hi-Res screens! $99.95
Universal Video Driver - Works w/all monitors & CoCos!- $29.95
Anti-Glare Screen $24.95
COLOR Monitors $179.95
TAXAN Tuner-Receive TV channels on any composite monitor $99.95

SAVE $10 OFF COLORCOM/E WITH A HAYES MODEM OFF TELEWRITER-64 WITH ANY PRINTER, KEYBOARD OR MONITOR **SAVE $10**

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NEW LOW PRICES FOR '86

SPREADSHEET

	Competition	DYNACALC
Screen	32X16	51X24
Precision	9 digits	16 digits
Hi-Res Graphics	NO	YES
Visicalc cmd format	NO	YES

New low price! 64K Disk $69.95
Side Wise -Print DYNACALC files up to 255 chars-sideways! $24.95

DATA BASE MANAGER

PRO-COLOR FILE 2.0 - 60 Data Flds, 8 Report Fmts, 4 Screen Fmts, 1020 bytes/record, Sort 3 Fields, Global Search, FAST ML Sort, Create Files Compatible w/DYNACALC! - Disk $49.95
Pro Color Dir and PCF Forms - Buy 'em both for only $29.95

BUY 'EM BOTH FOR
(DYNACALC & PCF 2.0 ONLY)
$99.95

DISK DRIVES

DRIVE 0 System* - SS/DD, 6ms, 40 Tracks, Half Height . $199.95
DRIVE 0 & 1 System* - $299.95
Disk Drive 1, 2 or 3 - $119.95
Power Supply & Case - $59.95
Drive 1 for 26-3129/31 - $89.95
Dbl Sided Drv 0 System* $239.95
* PLUS: controller-manual-cable

GAME CONTROLLERS

Wico Command Adapter - Now you can hookup 2 Atari type joystks to your CoCo for only $19.95!
Joystick/Mouse 10' Ext Cable - Great for CoCoMax users! $19.95
DELUXE Joystick - 360 Degree control with center return or analog positioning - $39.95

DISK SOFTWARE**

1. Max Edit (CoCo Max) .. $24.95
2. EZ Base (Database) ... $24.95
3. Graphicom $24.95
4. Graphicom Part II $24.95
5. Greeting Cd Designer . $24.95
6. Blackjack Royale $24.95
7. Spect'm Adv Generator $29.95
8. HARDCOPY(Specify PTR) $29.95

COCO II UPGRADES

Want to upgrade your new $69/$88 CoCo II? (See below !!)
4464 DRAMs - two chip 64K upgrade for 26-3134A and 26-3134B Korean CoCo II's .. $39.95
Extended BASIC - 28 pin ROM for 26-3134 A/B CoCo II's ... $34.95
Buy 'em BOTH for only - $69.95

DISK SOFTWARE **

Buy any 2 - Save 10%
Buy any 3 - Save 15%
Buy any 4 - Save 20%

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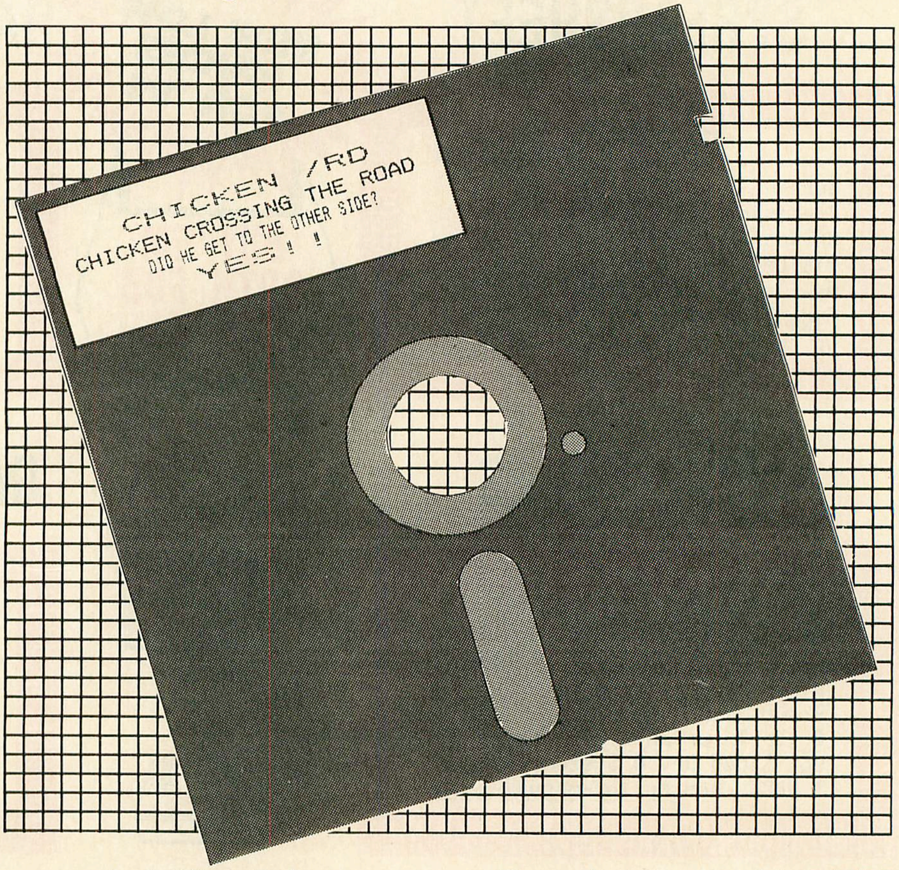
FREE - Send for our CoCo catalog flier !!!
Dealer inquiries invited !
Software submissions welcomed !

All orders plus $3.00 S/H (Foreign $5.00) - COD add $2.00 extra - NYS Residents add Sales Tax

16K ECB

Versatile Label Maker Eliminates Messy Hen Scratches


CHICKEN /RD
CHICKEN CROSSING THE ROAD
DID HE GET TO THE OTHER SIDE?
YES ! !

By Charles Baldridge

The Label Maker was written especially for those people who, like me, have a horde of unlabeled disks and can't write clearly enough to read by any means. Pick up a package of 3.5" by 15/16" fanfold labels and you are ready to clean up that disk collection!

The program is designed to run on any 16K computer with Extended BASIC. Disk is not required. It operates a DMP-200 or DMP-120 printer at 1200 Baud or, if you prefer, 600 Baud.

The program gives a type option for each line. Choose elongated, bold or standard. There is also a choice of character sizes ranging from ten characters per inch (standard) to 16.7 characters per inch (condensed). By mixing elongated type with the character sizes, there may be between five and 16 characters per inch (15 to 48 characters per line).

The following table gives the settings for each line length.

Characters per line	Elongated	Character size
15	Yes	Standard
18	Yes	Compressed
24	Yes	Condensed
30	No	Standard
36	No	Compressed
48	No	Condensed

Due to the operation of the DMP-200 and the DMP-120, elongated characters may not be mixed with bold characters.

When the program instructs you to ready the printer, be sure the print head is lined up with the top of the label and is online, otherwise the program will not print correctly.

(You may send questions about this program to the author at P.O. Box 541, Paintsville, KY 41240, phone 606-789-6883. Please enclose an SASE when writing.) ☐

Charles Baldridge is a student at Johnson Central High School in Paintsville, Kentucky. He has been working with computers for three years.

The listing: LABEL

```
10 CLEAR 2000
20 POKE150,41
30 CLS:GOSUB280
40 PRINT"BAUD RATE IS SET AT 120
0. DO YOUWISH TO CHANGE TO 600?"
:GOSUB540:IFA$<>"N"ANDA$<>"Y"THE
NGOSUB280
50 IFA$="Y"THENPOKE 150,88
60 INPUT"NUMBER OF LINES TO PRIN
T(1-4)";T
70 IF T<1 OR T>4 THEN PRINT"ONLY
```

A SPECTRUM PROJECTS SHOPPING LIST

SPECIAL 64K RAM CHIPS $19.95

A CHIP OFF THE OLD...

6821 Standard PIA	$9.95
6822 Industrial Grade PIA	$14.95
6847 VDG Chip	$19.95
6809E CPU Chip (NEW LOW PRICE)	$19.95
Basic ROM 1.2 Chip (30% FASTER)	$19.95
68769 (Fits Disk Basic Skt) Eprom	$19.95
Basic ROM 1.3 (Newest version)	$24.95
Disk ROM 1.1 (New DOS Command)	$29.95
New SAM Chip w/heatsink (74LS785)	$29.95
Ext Basic 1.1 ROM - NEW LOW PRICE	$29.95
Tandy 1000 128K RAM Upgrade Kit	$39.95
Eprom Eraser - 3 min erasure time	$49.95
Model 100 8K Upgrade - (SAVE $70)	$49.95
CoCo First Aid Kit - includes 2 PIAs, 6809E & SAM (Be Prepared!!!)	$59.95
64K CoCo II - w/NEW keyboard	$149.95
Eprom Prgmr (2ms speed/2K - 16K)	$149.95

COCO LIBRARY...

The CoCo Chronicles/1980-1985	$7.95
CoCo Memory Map	$14.95
Basic Programming Tricks Revealed	$14.95
The FACTS - Inside "guts" of CoCo	$16.95
500 Pokes, Peeks 'N Execs	$16.95
Basic 09 Tour Guide	$19.95
Assembly Language Programming	$19.95
Color Basic Unraveled	$19.95
Extended Basic Unraveled	$19.95
Disk Basic (1.0/1.1) Unraveled	$19.95
New! CoCo II Service Manual*	$24.95
SECOND Book & Tape of Adventures	$29.95
Official OS9 Manual Set	$39.95
The Complete Rainbow Guide to OS9	$19.95
W/Two Disk Package of demo pgms	$49.95
Color/Extended/Disk Basic Unraveled - Complete 3 Book Set - Save $10!	$49.95

MORE GOOD STUFF...

CoCo Light Pen - ~~$24.95~~ Save $5!	$19.95
Computize "Y" Box - More positive connections than a "Y" Cable	$29.95
Colorware Real Talker 2 (CoCo II)	$64.95
Super Voice - SC-02 Synthesizer	$79.95
PBJ WORDPAK-RS HiRes 80x24 disply	$99.95
Micro Works DS-69A Digitizer	$149.95

* - Specify CoCo II Catalogue Number

All orders plus $3.00 S/H (Foreign $5.00)
COD add $2.00 extra
NYS Residents add Sales Tax

COCO CABLES AND...

Printer/Modem 15' Extender Cable	$14.95
Tired of unplugging devices from your RS232 port? Try a RS232 "Y" Cable	$19.95
Disk Drive Cable (34pin - 34pin)	$19.95
Modem Cable - 6ft (DB25-DB25)	$19.95
Null Modem Cable - 4 pin to DB25	$24.95
Disk Interface/Rom Pak Extender - Move your disks & ROM Paks (3 feet)	$24.95
40 Pin Dual "Y" Cable - Hook up a Disk w/Voice, Word Pak, CoCo Max, etc	$29.95
Triple RS232 Switcher - Now select one of any three RS232 peripherals	$39.95
DELUXE RS232 Switcher - Dual switcher with 3 female DB-25 jacks	$59.95
40 Pin Triple "Y" Cable - Hook up any 3- Voice/Word/RS232/Digitizer PAKs	$39.95
Finally! 24" Multi-Pak Extender	$44.95

OTHER GOOD STUFF...

C-10 tapes in any quantity	49 cents
5 1/4" Diskettes, any quantity	.99 cents
OS-9 Quick Reference Guide	$3.95
6809E Quick Reference Guide	$3.95
32K, 64K or 128K RAM Button	$4.99
Blank Amdek 3" Disks	$4.99
Rompak w/Blank PC Brd-27xx series	$9.95
CoCo Keybd Adapter - Convert 26-3016 & 277-1019 keybds to D/E CoCo's!	$14.95
Video Clear - This cable will reduce TV interference created by CoCo!	$19.95
The Magic Box - Load Mod I/III Basic program tapes into the CoCo	$24.95
DOS Switcher - Select from any two DOSs (Disk 1.0 1.1, JDOS) in J&M ctlr	$24.95
256K RAM Chips (Set of 8)	$39.95
EARS-CoCo's first Voice Recognition unit w/95% accuracy & 64 Voice Prints!	$99.95
Master Key II w/Ext Cable	$109.95
Amdek Twin 3" Drvs w/controller	$249.95

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⌖⌖⌖ COLORFUL UTILITIES ⌖⌖⌖

COCO CHECKER*

Something possibly wrong with your CoCo??? CoCo CHECKER is the answer!! Will test your ROMs, RAMs, Disk Drives & Controller, Printer, Keyboard, Cassette, Joysticks, Sound, PIAs, VDG, Internal Clock Speed, Multi-Pak Interface and more!! 16K TAPE/DISK **$19.95** (see Jan '85 Rainbow Review)

MULTI-PAK CRAK

Save ROMPAKs to your 64K Disk system using the RS Multi-Pak Interface. Eliminate constant plugging in of ROMPAKs now by keeping all your PAK software on disk. Includes POKEs for "PROBLEM" ROMPAKs- including the NEW 16K PAKS! (Demon Attack,Dragons Lair,etc) 64K DISK **$24.95**

FAST DUPE II

Will format & backup a disk in only 1 PASS (up to 23 grans) & make up to 4 copies in 2 minutes! The must utility for every multiple Drive owner. 32K DISK **$14.95** (see May'85 Rainbow Review)

SPIT 'N IMAGE

A super upgrade from Disk Omni Clone! Back everything up! This amazing program handles "non standard" disks with ease. We haven't found any disk yet that it can't handle. Don't ever be caught without a backup again! Lowest price too! Beats most "copy protection" programs! 32K DISK **$29.95**

COCO SCREEN DUMP

The best screen dump program for the Panasonic, Epson & Gemini printers ever! Have the option of standard or reverse images w/regular or double sized proportional pictures. 600-9600 Baud too! A must for Graphicom and CoCo Calendar users. 16K TAPE/DISK **$19.95** (see Nov '84 Rainbow Review)

DISK UTILITY 2.1*

A multi-featured tool for USER FRIENDLY disk handling. Utilize a directory window to selectively sort, move, rename and kill file entries. Lightning fast Disk I/O for format, copy and backup. Examine contents of files, the Granule Table, plus the size, load addresses and entry points of all programs. Single command execution of both Basic and ML programs. 32K/64K DISK **$24.95** "Disk Utility has proven itself very quickly at my house" - Ed Ellers Oct '84 Rainbow Review pg. 220

NEW!

SPECTRUM FONT GENERATOR

Now you can write files using any CoCo Word Processor (Telewriter-64, VIP Writer, etc.) and convert them to special Highly Detailed character sets! Some of the character sets supported are Italics, Old English, Futuristic and Block. A character set editor is included to create custom sets or modify existing ones! Supports most dot-matrix printers! DISK **$29.95** (see Dec '85 Rainbow Review)

SPECTRUM DOS

Add 24 NEW Disk commands with 2 Hi-Res screens! Supports 40 track & Double-Sided drives, 6 ms stepping, auto disk search, error trapping & "EPROMABLE". 64K DISK ~~$49.95~~ New LOW price!! **$24.95**

SCHEMATIC DRAFTING PROCESSOR

Save time and design pro looking diagrams using a 480X540 pixel worksheet w/6 viewing windows. Over 30 electronic symbols w/10 definable symbols. (Even Logic gates & Multipin chips!) Print hard copy and save to disk. 64K DISK ~~$49.95~~ New LOW price!!! **$29.95** (see Jan '84 Rainbow Review)

NEW!

BASIC+

Basic+ provides ㉓ of the most used BASIC cmds w/one keystroke plus scrolling & editing w/single key! Also included is a 32 character typahead BUFFERED keybd w/auto key & repeat plus a 32K Print Spooler & Ptr Echo!! 64K DISK **$29.95** (see Jan '86 Rainbow Review pg. 192)

COCO CHECKBOOK

Use your CoCo to keep track of your checking and savings accounts! Printout individual personal checks! 32K/64K TAPE **$29.95** DISK **$39.95** (see April'85 pg. 210 & Oct'85 pg. 197 Rainbow Reviews)

*NOW AVAILABLE BY EXPRESS ORDER AT YOUR LOCAL RADIO SHACK STORE -

#90-0289 COCO CHECKER - #90-0290 DISK UTILITY 2.1

BUY ANY 4 PROGRAMS GET THE FIFTH FREE !*

*- No other discounts can be applied

DEMAND TO SEE THE R/S DEMO DISKS ! (FC#0249 & FC#0919)

⊕⊕⊕ COLORFUL UTILITIES ⊕⊕⊕

NEW!

COCO TEXT UTIL

Includes utilities that most CoCo word processors (TW-64, VIP Writer, etc.) leave out! Reset margins to correct length for uploading, convert all UPPER CASE text to mixed upper/lower, display total BYTE count, EASY rename & kill functions plus read or print ANY disk file! DISK **$19.95**

COCO VIDEO TITLER

Start your VCR tapes with dazzling title frames followed by professional countdown to black fade-outs! Use a title page editor with several sizes of text & background colors! 16K TAPE **$19.95**

PENPAL

It's here! CoCo's answer to 1-2-3! PENPAL combines Word Processing, Communications, Graphics, Data Base & Spread-sheet into a single integrated software package! 64K DISK INTRO PRICE **$69.95**

64K DISK UTILITY PACKAGE

Take advantage of an expanded 64K machine. Make an additional 8K of RAM available by relocating the Ext Basic ROM from $8000 to $D800. Copy ROMPAKS to disk (even "protected" PAKS) and create a 32K SPOOL buffer for printing. DISK **$21.95** (see July '83 Rainbow Review)

TAPE/DISK UTILITY

A powerful package that transfers tape to disk and disk to tape automatically. Does an automatic copy of an entire disk of programs to tape. Ideal for Rainbow On Tape to disk. Also copies tape to tape & prints tape & disk directories. TAPE/DISK **$24.95** (see Sept '83 Rainbow Review)

NEW!

SUPER DUPER UTILITIES

Finally! At last! A "SUPER DUPER" utility software package all rolled up into ONE!!! Includes such great utilities as: CoCo Disk Zap, Disk Encryption, Disk Mailing List, EZ Disk Master, Graphics ZOOM, Banner Creator, Function KEYS, Super INPUT/LINEINPUT, Basic Program PACKER, Alpha Directory, Basic SEARCH and much, much more!!! 32K DISK **$29.95**

COCO CALENDAR

Get organized for '86 TODAY with the CoCo Calendar! Designed for recording the entire year's occassions and daily appointments so you can plan ahead. You can store HUNDREDS of entries and our GRAPHIC Calendar will show all MEMOS! 32K DISK **$24.95** (see Mar '86 Rainbow Review)

THE OS-9 SOLUTION

NOW, a program that creates a "USER FRIENDLY" environment within OS-9! The OS-9 SOLUTION replaces 19 of the old "USER HOSTILE" commands with single keystroke, menu driven commands. No more typing in complex long pathnames or remembering complicated syntaxes! Set all XMODE parameters at the touch of keys! Requires OS-9 ver.01.01.00 **$39.95** (see Sept '85 Rainbow Review)

COCO-UTIL

NEW!

Now you can have the power to easily transfer Radio Shack Color Computer disk files to your MS-DOS machine - including the Tandy 1000 & IBM PC!!! You can also transfer MS-DOS files to your CoCo disk, even format CoCo disks! CoCo-Util will save you countless hours of retyping! No need to move your computer or printer anymore! Requires 128K MS-DOS computer w/2 disk drives - **$29.95**

NEW!

SOFTWARE BONANZA PACKAGE

Create an instant library of Spectrum Projects TOP Colorful Utility software. Select any of the following 12 programs to customize your own SPECTACULAR SOFTWARE BONANZA! CoCo Checker, Multi-Pak Crak, CoCo Screen Dump, Disk Utility 2.1, Spectrum Font Generator, Tape/Disk Utility, Fast Dupe II, 64K Disk Utility, Spectrum DOS, CoCo Calendar, Schematic Drafting Processor, OS-9 Solution, Graphicom, EZ Base or Blackjack Royale (a $300 plus value) for only **$99.95**!!!

All orders plus $3.00 S/H (Foreign $5.00) – COD add $2.00 extra – NYS Residents add Sales Tax

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COD ORDER HOT LINE 718-441-2807

```
 1 TO 4 LINES WILL FIT.":GOTO60
80 CLS
90 FORL=1 TO T
100 GOSUB300
110 NEXT
120 CLS:GOSUB280:PRINT"READY PRI
NTER AND PRESS ENTER";:INPUTDU$
130 FORL=1 TO T
140 TA=(CL(L)-(LEN(L$(L))-4))/2
150 IFLEFT$(D$(L),1)="Y"THENPRIN
T#-2,CHR$(27)CHR$(31)
160 IFLEFT$(E$(L),1)="Y"THENPRIN
T#-2,CHR$(27)CHR$(14)
170 PRINT#-2,TAB(TA)L$(L)
180 PRINT#-2,CHR$(27)CHR$(15)
190 PRINT#-2,CHR$(27)CHR$(32)
200 FORX=1 TO3:PRINT#-2,CHR$(27)
CHR$(10);:NEXT
210 NEXT
220 CLS:GOSUB280:PRINT"DO YOU WA
NT ANOTHER COPY(Y/N)"
230 GOSUB540:IFA$<>"Y"ANDA$<>"N"
THENGOSUB540
240 IFA$="Y"THEN120
250 PRINT"DO YOU WANT TO PRINT A
 DIFFERENTLABEL?(Y/N)"
260 GOSUB540:IFA$<>"Y"ANDA$<>"N"
THENGOSUB540
270 IFA$="Y"THENRUNELSECLS:END
280 PRINTSTRING$(32,"*");:PRINT"
*LABEL PRINTER FOR THE DMP-200 *
";
290 PRINT"*     BY CHARLES BALDR
IDGE      *";:PRINTSTRING$(32,"*"
);:RETURN
300 CLS:GOSUB280
310 PRINT"PRINT STYLE FOR LINE N
UMBER"L
320 INPUT"ELONGATED";E$(L):IFLEF
T$(E$(L),1)="Y"THEND$(L)="":GOTO
 360
330 ZZ$=LEFT$(E$(L),1):IFZZ$<>"Y
"ANDZZ$<>"N"THENPRINT"INCORRECT
INPUT. TRY AGAIN.":GOTO 320
340 INPUT"DOUBLE STRIKE";D$(L)
350 ZZ$=LEFT$(D$(L),1):IFZZ$<>"Y
"ANDZZ$<>"N"THENPRINT"INCORRECT
INPUT. TRY AGAIN.":GOTO 340
360 PRINT"          CHARACTER SIZ
E"
370 PRINT"   1. STANDARD"
380 PRINT"   2. COMPRESSED"
390 PRINT"   3. CONDENSED"
400 INPUTCS
410 IFCS<1ORCS>3THENPRINT"INCORR
ECT INPUT. TRY AGAIN.":GOTO400
420 IFCS=1THEN L$(L)=L$(L)+CHR$(
27)+CHR$(19)
430 IFCS=2THENL$(L)=CHR$(27)+CHR
$(23)
440 IFCS=3THENL$(L)=L$(L)+CHR$(2
7)+CHR$(20)
450 INPUT"TEXT";T$
460 IFCS=1THENCL(L)=30
470 IFCS=2THENCL(L)=36
480 IFCS=3THENCL(L)=48
490 IFLEFT$(E$(L),1)="Y"THENCL(L
)=CL(L)/2
500 IF LEN(T$)>CL(L) THENPRINT"L
INE WILL NOT FIT. DO YOU WANT  T
O CHANGE CHARACTER SIZE?":GOSUB5
40:IFA$="Y"THENL$(L)="":GOTO360E
LSEGOTO450
510 L$(L)=L$(L)+T$
520 L$(L)=L$(L)+CHR$(27)+CHR$(19
)
530 RETURN
540 A$=INKEY$:IFA$=""THEN540
550 RETURN
```

Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary explaining how the program works. Generally, we're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submissions Editor, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

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Handicappers Enter Home Stretch with Pace 1

By Pasquale Suppe

The idea of accurately predicting the outcome of future events is a fascinating obsession to many. What will the weather be like on next Tuesday? The Tuesday after that? Who will win the Super Bowl? What will the value of a particular stock be a month or a year or a decade from now? Who will win the Kentucky Derby this year?

Forecasters soon learn that the prediction business is difficult because of the complexities involved and the lack of total knowledge necessary to make one's model foolproof. Generally, the forecaster's methodology involves the following considerations:

1) Determination of which factors to analyze in order to arrive at a sound prediction based on interactions in the "real world" environment.
2) Determination of if, where and in what form the raw data needed can be made available to the forecaster in a timely and accurate fashion.
3) Determination of the proper algorithm to be used to support the prediction process.
4) Determination of how much subjectivity or inference must be allowed to enter into the actual predictions made.
5) The creation and maintenance of an adequate feedback system to enable evaluation and/or alteration of the predictive process. This is necessary to enhance its reliability and accuracy in the future.

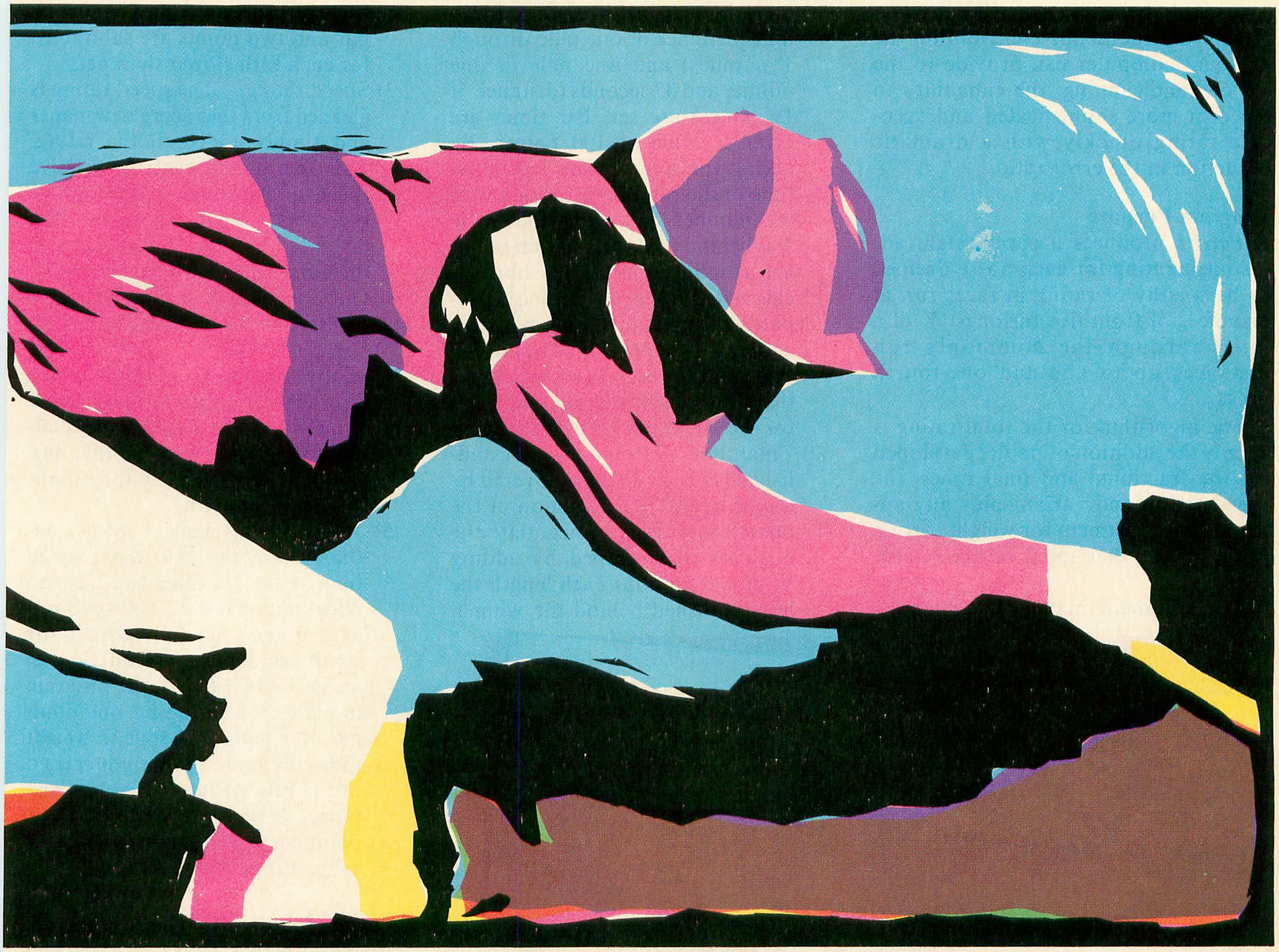
Two fundamental concepts come into play when attempting to select the most logical horse to play in a given race. First, the relative quality or potential of horses entered and secondly, the form or physical condition of the horses in the race.

Determining Thoroughbred Quality

Class — This measure of the quality of a horse is based upon earnings, level of competition at which he has been successful, or purse sizes where good performances have been noted. Competition levels range from maiden events (non-winners), to claiming contests, to starter events, allowances, handicaps and famous stakes races. Huge differences in ability are to be expected

---

Pat Suppe is employed by a major insurance company and teaches on a part-time basis at Post College in Waterbury, Connecticut. He holds a master's degree in business administration from the University of Hartford.



when comparing contests at major league ovals such as Santa Anita and Belmont to those runners campaigning at minor tracks and the state fair circuits.

Speed — This can be measured in a variety of fashions, from simple (but ineffective) comparisons of the speed ratings printed in the racing papers to very sophisticated evaluations of the final times run for each commonly run distance. Speed charts are usually used for the generation of a speed rating.

Pace — This method of assessing the relative quality of horse flesh entered in a given event takes into account the time of the horse at an appropriate point of a race. For example, the pace handicapper assesses the ½ mile point of a six furlong (¾ mile) race as well as the final time of the race in measuring quality. A common way of doing this is to assign a given number of points for a par time and add one point for each $^1/_5$ of a second the horse beats that time, or subtract one point for each $^1/_5$ of a second slower than the par time.

Consistency — Consistency handicappers assess quality by evaluating the past frequencies of entrants relative to wins versus total number of starts. They also evaluate in-the-money (first, second or third) finishes versus total races entered. Some practitioners use the lifetime records, some the current year and others only races run during the past several months.

Miscellaneous — There are a variety of other methods to separate the wheat from the chaff. Trip handicapping assesses the relative ease or difficulty encountered during the running of a recent race. This subjective analysis includes allowing for poor judgment of the jockey, horses being blocked, breaking poorly, etc. Assuming that a similar problem does not occur today, the horse will probably perform better. Other handicappers carefully check the records of the trainers and/or jockeys at particular levels of competition, on surface types (grass vs. dirt), at particular distances, etc., in coming up with their selections. Angle players base their selections on the use of hard-and-fast rules that isolate horses who have shown improvement in running position, speed rating/final times, early speed, frequent recent races, distance switches, jockey switches or favorite in the most recent race among other things.

Most of the methods employed by selectors involve the analysis of one or more of these various attributes. Since most handicappers use manual methods to develop their ratings, many take shortcuts that can decrease the accuracy of the figures produced. Many clerical errors occur that could be avoided through the use of a personal computer equipped with well-designed software. Herein lies the major contribution the personal computer can provide to the art of handicapping: the capability to perform more sophisticated and accurate rating quickly with a dramatic reduction in the error ratio.

Program Purpose

Pace 1 produces a pace/weight adjustment rating for each horse deemed to be worthy of rating in races run at distances of from five furlongs (⅝ of a mile) through the commonly run distances up to one and one-fourth miles.

The algorithm for the total rating is simply the addition of points developed for the fractional and final times, the speed rating and variant plus any appropriate adjustment for weight carried today versus that toted in the ratable race.

The arithmetic manner by which the components are assigned a numeric value are:

1) Fractional time — Par times of 48 seconds for ½ mile (races from five furlongs through seven furlongs), one minute and 12$\frac{1}{5}$ seconds for ¾ mile (distance of one mile through 1$\frac{3}{16}$ miles) and one mile in one minute and 37 seconds (distance of 1¼ miles) are set. Par times are given a value of 100 points. By taking the appropriate fractional time of the ratable race along with the number of lengths the horse was behind the leader at that point, a fractional time for the horse is calculated. This in turn is compared to the appropriate par time and a rating is developed by adding one point for each $\frac{1}{5}$ second faster than par or subtracting one point for each $\frac{1}{5}$ second slower than par.
2) Final time — Par times are established for each distance covered by the program. A calculation of the horse's total time to negotiate the distance is developed by adding $\frac{1}{5}$ of a second for each length the horse finished behind the winner. If the horse should win, the final time of the race is used. The final time is compared with the par time for the distance. Par is worth 200 points. Two points are added for each fifth or a second faster than par and two points are subtracted for each fifth slower than par.
3) Speed rating— The speed rating is gleaned from the racing newspaper and simply added to the rating. This is a measure of the relative speed of the horse in the ratable race versus track record for that distance. A rating of 100 indicates the horse equaled the track record. One point is deducted for each fifth of a second slower than the record.
4) Variant — This is a measure of the relative speed of the track on the day the ratable race was run as well as an indirect measure of the quality of the horses who ran that day. One-half of the value of the variant is used in the rating.
5) Weight adjustment — Many authorities in the field have stated that the weight toted can have an effect on the horse's ability to run at a given time. To adjust for significant increases/reductions in weight to be carried, the program modifies the rating by one point per four pounds change in weight today compared to weight carried in the ratable race for sprint distances (under one mile) and one point per three pounds change for route distances.

Required Inputs

Weight Carried Today — The first prompt you see on the screen is WEIGHT CARRIED TODAY. Simply key in the weight scheduled to be toted today by this horse and press ENTER.

Distance Code — The second prompt is:

Distance Code Conversions

5 furlongs	=	1
5½ furlongs	=	2
6 furlongs	=	3
6½ furlongs	=	4
7 furlongs	=	5
1 mile	=	6
1 mile 40 yards	=	7
1 mile 70 yards	=	8
1$\frac{1}{16}$ mile	=	9
1⅛ mile	=	10
1$\frac{3}{16}$ mile	=	11
1¼ mile	=	12

Key in the proper code value one

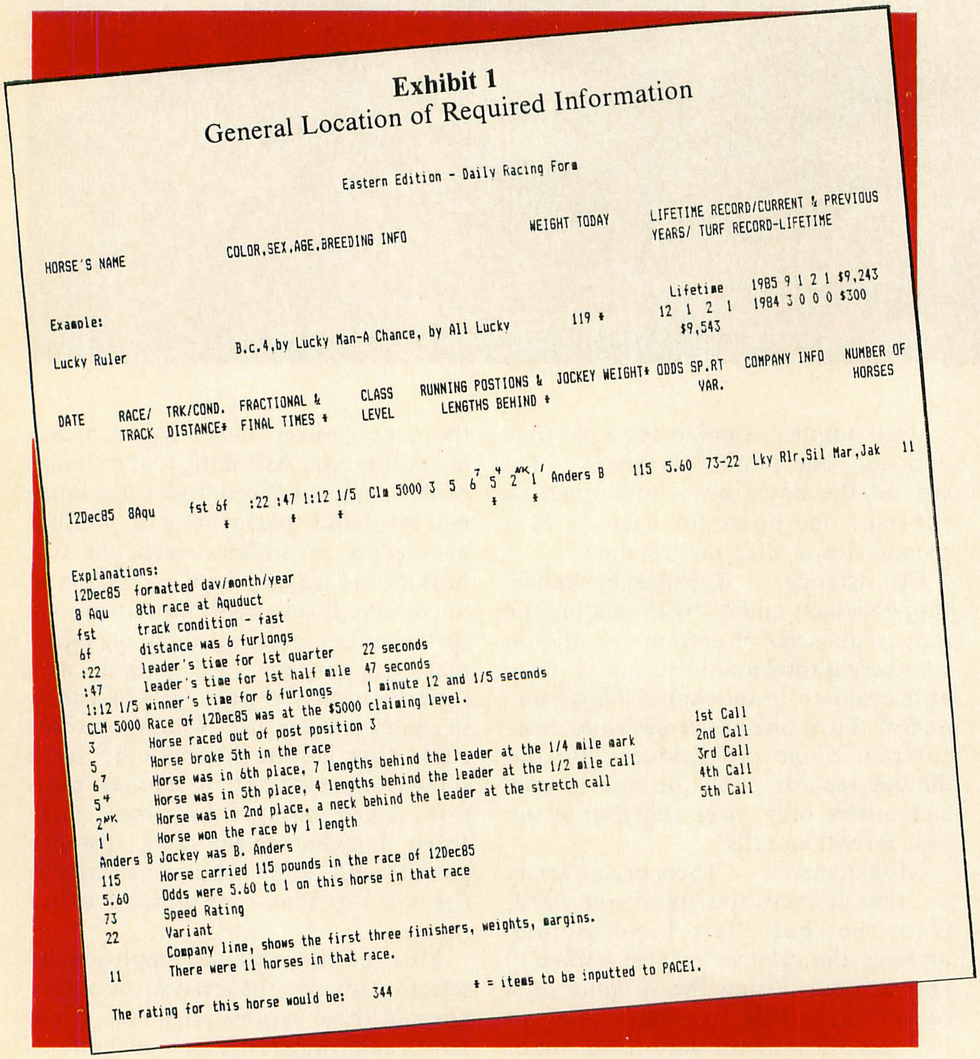


Exhibit 1
General Location of Required Information

```
                        Eastern Edition - Daily Racing Form

                                                  WEIGHT TODAY   LIFETIME RECORD/CURRENT & PREVIOUS
                     COLOR,SEX,AGE,BREEDING INFO                  YEARS/ TURF RECORD-LIFETIME
HORSE'S NAME

                                                                  Lifetime    1985 9 1 2 1 $9,243
Example:                                          119 *          12  1  2  1  1984 3 0 0 0 $300
                                                                    $9,543
Lucky Ruler          B.c.4,by Lucky Man-A Chance, by All Lucky

                                                                                              NUMBER OF
                                   CLASS  RUNNING POSTIONS &  JOCKEY WEIGHT* ODDS SP.RT  COMPANY INFO  HORSES
DATE    RACE/ TRK/COND.  FRACTIONAL &  LEVEL    LENGTHS BEHIND *                  VAR.
        TRACK DISTANCE*  FINAL TIMES *

                                                 7 4 NK 1
12Dec85  8Aqu    fst 6f   :22 :47 1:12 1/5  Clm 5000 3  5  6  5  2  1  Anders B   115  5.60  73-22  Lky Rlr,Sil Mar,Jak   11
                     *        *     *                          *     *

Explanations:
12Dec85  formatted dav/month/year
8 Aqu    8th race at Aquduct
fst      track condition - fast
6f       distance was 6 furlongs
:22      leader's time for 1st quarter   22 seconds
:47      leader's time for 1st half mile  47 seconds
1:12 1/5 winner's time for 6 furlongs     1 minute 12 and 1/5 seconds
CLM 5000 Race of 12Dec85 was at the $5000 claiming level.
3        Horse raced out of post position 3                                    1st Call
5        Horse broke 5th in the race                                           2nd Call
6^7      Horse was in 6th place, 7 lengths behind the leader at the 1/4 mile mark  3rd Call
5^4      Horse was in 5th place, 4 lengths behind the leader at the 1/2 mile call  4th Call
2^NK     Horse was in 2nd place, a neck behind the leader at the stretch call  5th Call
1^1      Horse won the race by 1 length
Anders B Jockey was B. Anders
115      Horse carried 115 pounds in the race of 12Dec85
5.60     Odds were 5.60 to 1 on this horse in that race
73       Speed Rating
22       Variant
         Company line, shows the first three finishers, weights, margins.
11       There were 11 horses in that race.
                                                  * = items to be inputted to PACE1.
The rating for this horse would be:   344
```

through 12 and press ENTER. For example, if the ratable race was at a distance of six furlongs, key in `3` and press ENTER.

"Prudence dictates we identify races that are playable and the horses that should be rated."

Fractional Time — Always use the second fractional time shown in the racing paper (see Exhibit 1). Use the following format to indicate both the fractional and final times:

1) Ignore the colon (:)
2) If any fifths are shown, enter them after a period (.).

Examples:

:58 2/5 key in `58.2` and press ENTER
1:12 key in `112` and press ENTER
1:24 3/5 key in `124.3` and press ENTER

Final Time — Enter the final time for the ratable race in the same format as for fractional times.

Lengths Behind Third Call — 1) If the horse was leading at the third call, simply press the ENTER key. 2) If not leading, then type in the lengths behind full lengths and fractions, as applicable.

a nose (no) = .03
a head (hd) = .06
a neck (nk) = .12
¼ = .25
½ = .5
¾ = .75

If the horse was behind the leader by:

2½ lengths - key in `2.5` and press ENTER
1¼ lengths - key in `1.25` and press ENTER
a head - key in `.06` and press ENTER
11¾ lengths - key in `11.75` and press ENTER

Note: At 5 and 5½ furlongs the third call is taken at ⅜ rather than ½ mile, but for our purposes it is accurate enough.

Length Behind Finish — 1) If the horse won the race, press ENTER. 2) Key in the losing margin using the same format as for the Lengths Behind Third Call.

Weight Carried Ratable — Key in the weight carried and press ENTER.

The listing: PACE 1

```
10 REM "PACE1"
20 DIM X(12)
30 X(1)=0
40 X(2)=6
50 X(3)=12.2
60 X(4)=18.4
70 X(5)=24.6
80 X(6)=37.4
90 X(7)=39.6
100 X(8)=41.8
110 X(9)=44
120 X(10)=51.2
130 X(11)=58.4
140 X(12)=65.6
150 CLS
160 INPUT "WEIGHT CARRIED TODAY
  ";WT
170 IF WT<90 OR WT>150 THEN GOTO
 160
180 PRINT "SELECT DISTANCE CODE"
190 PRINT
200 PRINT "5 FURLONGS = 1"
210 PRINT "5 1/2 FUR. = 2"
220 PRINT "6 FURLONGS = 3"
230 PRINT "6 1/2 FUR. = 4"
240 PRINT "7 FURLONGS = 5"
250 PRINT "1 MILE     = 6"
260 PRINT "1 M. 40 YD = 7"
270 PRINT "1 M. 70 YD = 8"
280 PRINT "1 1/16 M.  = 9"
290 PRINT "1 1/8 M.   =10"
300 PRINT "1 3/16 M.  =11"
310 PRINT "1 1/4 M.   =12"
320 PRINT
330 INPUT "DISTANCE CODE IS ";DC
340 IF DC=999 THEN GOTO 150
350 IF DC<1 OR DC>12 THEN GOTO 3
30
360 INPUT "FRACTIONAL TIME
  ";FR
370 IF FR=999 THEN GOTO 330
380 IF FR<40 OR FR>150 THEN GOTO
 360
390 INPUT "FINAL TIME
  ";FT
400 IF FT=999 THEN GOTO 360
410 IF FT<50 OR FT>240 THEN GOTO
 390
420 INPUT "LENGTHS BEHIND 3RD CA
LL";LT
430 IF LT=999 THEN GOTO 390
440 IF LT<0 OR LT>50 THEN GOTO 4
20
450 INPUT "LENGTHS BEHIND FINISH
  ";LF
460 IF LF=999 THEN GOTO 420
470 IF LF<0 OR LF>50 THEN GOTO 4
50
480 INPUT "WEIGHT CARRIED RATEAB
LE";WR
490 IF WR=999 THEN GOTO 450
500 IF WR<90 OR WR>150 THEN GOTO
 480
```

Speed Rating — Key in the speed rating and press ENTER.

Variant — Key in the variant and press ENTER.

In the event you make an input error, type in 999 at the next prompt and the program re-prompts for the previous input item. In the event you enter a value out of the range edited for, an automatic re-prompt occurs.

Guidelines

Rarely does one encounter a totally versatile horse with the ability to perform strongly at sprint and route distances, and on grass and dirt surfaces, regardless of the level of competition and the location of the track. The vast majority of racehorses prefer to run at a small range of distances, on a particular surface type and among their class peers. Therefore, prudence dictates that we identify types of races that are playable and the horses within those races that should be rated.

Playable races are races run at distances of five furlongs through 1½ miles except for steeplechase/hurdle races and those containing more than two unratable horses. Horses whose past performance chart shows at least one race on today's surface type (grass or dirt) within one furlong of the distance of today's race are ratable. Exception: If today's race is 1½ miles in length, it can be rated using race(s) of 1¼ miles. The best race to rate is the most recent or the last race that fits the above description, preferably one at today's track. Next, the race where the highest speed rating was earned with the horse finishing with five lengths of the winner. If a clear-cut decision cannot be

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made, rate both of the most recent races and use the higher rating for selection purposes.

Unratable horses are those whose past performance chart fails to show at least one race as outlined above. Naturally, a horse making his first start is unratable.

Risk

In order to avoid unnecessary risk in wagering, this procedure is recommended. Wager on the highest rated horse only if all of the following conditions are met:

1) The race contains no more than two unratable horses after scratches.
2) The horse's most recent race occurred within the past 20 days.
3) The horse was able to finish in-the-money in at least one of his three most recent races on today's surface-type and within one furlong of today's distance.
4) The odds offered on the horse are at least two-to-one.

If these stipulations are not met, it is generally smart to pass the race. Experienced players will occasionally find a valid long shot by stretching one or more of the rules and/or playing the second highest rated horse when the top-rated animal can be reasonably eliminated.

If you don't receive RAINBOW ON TAPE or just don't like typing, send $15 to me at P.O. Box 914, Southington, CT 06489. This program is available only on cassette tape in Extended BASIC. The version I send to you will contain some additional features: option for printer instead of screen displays of ratings (sorted by rating), three additional distances and some user-friendly features.

Adjustments

Since the ratings are developed based on the expected weight to be carried, there must be an allowance for change. An adjustment to the rating can be made at the track when the actual impost differs by three pounds for races of one mile or longer or four pounds for sprint events. For route races, add one point for each three pounds less carried and subtract one point for each three pounds more weight carried. For sprints, add one point per four pounds less and subtract one point for each four pounds more.

In Conclusion

The computer used for weather forecasts is a tool that functions only as well as the design and coding of the program(s) dealing with the variables that affect the weather. The handicapper who uses a PC for assistance must keep things in the proper perspective. The personal computer is merely a tool to help with the more difficult and tedious mathematical aspects of handicapping. It is not a miracle machine that generates unlimited wealth.

The potential user of this method of rating is advised to perform a paper workout of the system before using it live to ensure that it has predictive value at your local track. □

```
510 INPUT "SPEED RATING
  ";SR
520 IF SR=999 THEN GOTO 480
530 IF SR<0 OR SR>120 THEN GOTO
510
540 INPUT "VARIANT
  ";VA
550 IF VA=999 THEN GOTO 510
560 IF VA<0 OR VA>100 THEN GOTO
540
570 IF DC<6 THEN LET WA=((WR-WT)
/4) ELSE LET WA=((WR-WT)/3)
580 GOSUB 690
590 GOSUB 910
600 LET R=WA+A+B+SR+(VA*.5)
610 LET R=INT (R)
620 CLS
630 PRINT "TOTAL RATING IS ";R
640 PRINT
650 PRINT
660 PRINT "WRITE RATING IN PAPER
"
670 INPUT "ANOTHER HORSE ? ENTER
 1 ";D
680 IF D=1 THEN GOTO 150 ELSE GO
TO 660
690 IF FT>=200 THEN LET M=2
700 IF FT>=200 THEN GOTO 740
710 IF FT>=100 THEN LET M=1
720 IF FT>=100 THEN GOTO 740
730 LET M=0
740 IF FT>=200 THEN LET S=FT-200
750 IF FT>=200 THEN GOTO 790
760 IF FT>=100 THEN LET S=FT-100
770 IF FT>=100 THEN GOTO 790
780 LET S=FT
790 LET T=S-INT (S)
800 LET T=T*2
810 LET S=INT (S)
820 LET FT=(M*60)+S+T
830 LET FT=FT+(LF*.2)
840 FOR X=1 TO 12
850 LET K=X(DC)+56
860 NEXT X
870 LET B=FT-K
880 LET B=B*10
890 LET B=200-B
900 RETURN
910 IF FR>=100 THEN LET M=1 ELSE
 LET M=0
920 IF FR>=100 THEN LET S=FR-100
 ELSE LET S=FR
930 LET T=S-INT (S)
940 LET S=INT (S)
950 LET T=T*2
960 LET FR=(M*60)+S+T
970 LET FR=FR+(LT*.2)
980 IF DC<6 THEN LET A=FR-48
990 IF DC>5 AND DC<12 THEN LET A
=FR-72.4
1000 IF DC=12 THEN LET A=FR-97
1010 LET A=A*5
1020 LET A=100-A
1030 RETURN
```

PRINTER UTILITY

16K Disk

16K ECB

Outfox Those Narrow Printers with Rotate

By John West

This program is designed to help those who have narrow carriage dot-matrix printers but who occasionally have need to print wide documents. The program runs without Extended BASIC, but at least 16K of memory is required.

The *Rotate* program accepts any file that has been saved in ASCII format, and prints it sideways in as many columns with as many spaces between the columns as desired. It prints 50 lines per column.

The graphics characters are written for my printer, which is a Radio Shack DMP-120. The characters are high quality with both upper- and lowercase and real descenders. They are generated on an 8 by 16 dot-matrix grid using the condensed graphics mode (the print codes are listed in Line 150 of Listing 1 and in Line 160 of Listing 4).

The print density is almost identical to that of pica print on a conventional typewriter, allowing 50 lines from top to bottom on an 8½-inch sheet and up to 115 characters across on an 11-inch page. Of course the line length is not limited to one page. By using roll or fanfold paper, lines of up to 255 characters are possible, and by using parallel columns with no space between, the line width can be extended indefinitely.

Listing 3 is a routine to reverse the data in case you have

John West holds a bachelor's degree in electrical engineering. He has traveled extensively in the United States and Canada as a control systems engineering specialist, but he now works as a full-time pastor for a fundamental denominational church in Durant, Oklahoma. He writes his own software for use in the church.

a printer that has a bottom LSB instead of the top LSB, which is used on mine.

Listing 2 is a routine to generate a data file to contain the graphics codes for the characters. This saves approximately 4K of memory, which is needed for large documents.

Listing 1 is the main program. It reads a text file that has been saved in ASCII format, then prints it sideways. Listing 4 is the same as Listing 1, except written for a tape-based system.

Type the text using *Scripsit* and print it to tape or disk. Then run the *Rotate* program to print it sideways.

The program is written for a 16K Color Computer, but if Extended BASIC is installed in the 16K machine, the command `POKE 25,6:NEW` must be entered before loading the *Rotate* program. The disk version (Listing 1) runs on a 32K machine with no special instructions, but for 16K disk, enter `PCLEAR1` before loading the *Rotate* program then change the `CLEAR` statement in Line 80 from 13000 to 8700. The average line length in the text is now limited to 150 characters, but if longer lines are needed, they can be assembled in adjacent columns when the text is saved.

When the program is run, the computer prompts by asking if the text has been saved on tape or disk (if Listing 1 is used), then asks for the filename under which the text has been saved. (Be sure to include the extension if it is not a data file.) It then asks how many columns are wanted. (If you don't know, use a sufficiently large number to cover the document. The program stops when it runs out of text.) Finally, enter the number of spaces between the columns. When this question has been answered, the text will be read 50 lines at a time then printed sideways.

Since 14 graphics characters are required to form one letter of the alphabet, it takes 14 times as long to print a document sideways as it does to print it in the normal manner.

(Your questions about this program may be directed to Mr. West at P.O. Box 386, Durant, OK 74702, phone 405-924-7024. Please enclose an SASE when writing.) ☐

Listing 1: ROTATE 1

```
10 '* * * * * * * * * * * * * *
20 '*         ROTATE          *
30 '*       CREATED BY        *
40 '*       JOHN  WEST        *
50 '*     P.O. BOX  386       *
60 '*   DURANT, OK  74702     *
70 '* * * * * * * * * * * * * *
80 CLS:CLEAR13000:DIMCH$(90),B$(
50)
90 'LOAD GRAPHICS LETTER CODE
100 OPEN"I",#1,"SIDWS"
110 FORA=1TO90
120 INPUT#1,CH$(A)
130 NEXTA
140 CLOSE
150 PRINT#-2,CHR$(27)CHR$(20)CHR
$(18);'SET PRINTER TO CONDENSED
PRINT AND GRAPHICS MODE
160 INPUT"ENTER FILE NAME OF TEX
T";A$
170 INPUT"MAXIMUM # OF CLMNS";A:
A=A*50'50 LINES PER COLUMN
180 INPUT"# OF SPACES BETWEEN CO
LUMNS";Z
190 CLS:PRINT"<D>ISK OR <T>APE?"
200 T$=INKEY$:IFT$<>"T"ANDT$<>"D
"THEN200
210 PRINT,T$
220 N=0:IFT$="D"THENOPEN"I",#1,A
$:GOSUB260:GOTO240
230 OPEN"I",#-1,A$:GOSUB260
240 IFM<A THENN=N+50:GOSUB260:GO
TO240
250 END
260 FORX=1TO50:B$(X)="":NEXTX'ER
ASE EXISTING TEXT
270 FOR M=N+1 TON+50:IFT$="D"THE
NIFEOF(1)THENA=M:GOTO310ELSELINE
INPUT#1,D$:GOTO290
280 IFEOF(-1)THENA=M:GOTO330ELSE
LINEINPUT#-1,D$
290 B$(M-N)=D$
300 NEXTM
310 FORX=1TOM-N-1
320 IFLL>LEN(B$(X))THENNEXTX ELS
ELL=LEN(B$(X)):NEXTX'FIND LENGTH
 OF LONGEST LINE OF TEXT
330 L=0
340 L=L+1:C$="":D=0:FORX=M-N-1 T
O1STEP-1'READ FROM BOTTOM TO TOP
350 IFL>LL THENPRINT#-2,STRING$(
Z,13);:RETURN'PUT SPACES BETWEEN
 COLUMNS
360 IFL>LEN(B$(X))THENC=91:GOTO3
80'IF THIS LINE IS SHORTER THAN
POSITION BEING PRINTED THEN INSE
RT BLANK
370 C=ASC(MID$(B$(X),L,1)):IFC<3
3ORC>122THENC=91'INSERT BLANK FO
R UNPRINTABLE CODE
380 C=C-32:PRINT#-2,CH$(C)CHR$(1
28)CHR$(128);'PRINT CHARACTER -
ADD 2 SPACES ON BOTTOM
390 NEXTX
400 PRINT#-2:GOTO340'COMPLETE TH
E LINE
```

Listing 2: DATA

```
10 CLEAR1500:DIMCH$(90)
20 FOR A=1 TO21:READB:A$=A$+CHR$
(B):NEXTA'LOAD SCREEN DISPLAY
30 PRINT"<T>APE OR <D>ISK
40 T$=INKEY$:IFT$<>"T"ANDT$<>"D"
THEN40
50 IFT$="T"THEN110
60 CLS:PRINT@68,A$'DISPLAY ON SC
REEN
70 FORA=1TO90:PRINT@176,CHR$(A+3
2):FORB=1TO14
```

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A top-flight 6809 programmer, Steve authored such CoCo programs as Tandy's *Zaxxon*, *Sands of Egypt*, *Micro-Painter* and *Mega-Bug* during his association with Datasoft, Inc. He now handles product development for his own company, SRB Software, and, through it, has produced, among others, *Stellar Life Line*, *The Motion Picture* and *Ghana Bwana*.

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```
80 READC:CH$(A)=CH$(A)+CHR$(C+12
8)'GENERATE QUICK ACCESS GRAPHIC
S CODE FOR DISK SYSTEM
90 NEXTB,A
100 OPEN"O",#1,"SIDWS":FORX=1TO9
0:PRINT#1,CH$(X):NEXTX:CLOSE:END
110 INPUT"POSITION TAPE TO RECOR
D AFTER   'ROTATE' PROGRAM";A:CL
S:PRINT:PRINT:PRINTA$:OPEN"O",#-
1,"SIDWS"
120 FORA=1TO90:FORB=1TO14:READX
130 PRINT#-1,X'STORE GRAPHICS CO
DE FOR TAPE BASED SYSTEM
140 NEXTB,A
150 CLOSE
160 END
170 DATA 71, 82, 65, 80, 72, 73,
 67, 83, 32, 66, 89, 32, 74, 79,
 72, 78, 32, 87, 69, 83, 84
180 DATA 0, 0, 0, 8, 8, 0, 0, 8,
 8, 8, 8, 8, 8, 8
190 DATA 0, 0, 0, 0, 0, 0, 0, 0,
 36, 36, 36, 0, 0, 0
200 DATA 0, 0, 0, 0, 40, 40, 40,
 124, 40, 124, 40, 40, 40, 0
210 DATA 0, 0, 0, 24, 60, 26, 88
, 88, 56, 28, 28, 26, 60, 24
220 DATA 0, 0, 0, 32, 80, 82, 34
, 8, 16, 32, 68, 74, 10, 4
230 DATA 0, 0, 0, 92, 34, 18, 34
, 82, 20, 8, 12, 18, 18, 12
240 DATA 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 8, 8, 24, 24
250 DATA 0, 0, 0, 32, 16, 8, 8,
4, 4, 4, 8, 8, 16, 32
260 DATA 0, 0, 0, 2, 4, 8, 8, 16
, 16, 16, 8, 8, 4, 2
270 DATA 0, 0, 0, 0, 0, 0, 0, 36
, 24, 90, 126, 90, 24, 36
280 DATA 0, 0, 0, 0, 0, 8, 8, 8,
 62, 8, 8, 8, 0, 0
290 DATA 0, 2, 4, 12, 12, 12, 0,
 0, 0, 0, 0, 0, 0, 0
300 DATA 0, 0, 0, 0, 0, 0, 0, 0,
 62, 0, 0, 0, 0, 0
310 DATA 0, 0, 0, 12, 12, 0, 0,
0, 0, 0, 0, 0, 0, 0
320 DATA 0, 0, 0, 0, 0, 2, 2, 4,
 8, 16, 32, 64, 64, 0
330 DATA 0, 0, 0, 24, 60, 66, 70
, 74, 82, 98, 98, 66, 60, 24
340 DATA 0, 0, 0, 60, 8, 8, 8, 8
, 8, 8, 8, 10, 12, 8
350 DATA 0, 0, 0, 126, 2, 2, 4,
24, 32, 64, 64, 66, 36, 24
360 DATA 0, 0, 0, 60, 36, 66, 64
, 32, 28, 32, 64, 66, 36, 60
370 DATA 0, 0, 0, 32, 32, 32, 12
6, 36, 36, 40, 40, 48, 48, 32
380 DATA 0, 0, 0, 60, 36, 66, 64
, 64, 62, 2, 2, 2, 2, 126
390 DATA 0, 0, 0, 60, 36, 66, 66
, 34, 62, 2, 2, 2, 4, 56
400 DATA 0, 0, 0, 4, 4, 4, 4, 4,
 8, 16, 32, 64, 66, 126
410 DATA 0, 0, 0, 60, 36, 66, 66
, 36, 24, 36, 66, 66, 36, 60
420 DATA 0, 0, 0, 24, 36, 64, 64
, 64, 124, 100, 66, 66, 36, 60
430 DATA 0, 0, 0, 0, 12, 12, 0,
0, 12, 12, 0, 0, 0, 0
440 DATA 0, 2, 4, 12, 12, 0, 0,
0, 12, 12, 0, 0, 0, 0
450 DATA 0, 0, 0, 64, 32, 16, 8,
 4, 2, 4, 8, 16, 32, 64
460 DATA 0, 0, 0, 0, 0, 0, 62, 0
, 62, 0, 0, 0, 0, 0
470 DATA 0, 0, 0, 2, 4, 8, 16, 3
2, 64, 32, 16, 8, 4, 2
480 DATA 0, 0, 0, 8, 0, 8, 8, 16
, 32, 64, 66, 66, 36, 24
490 DATA 0, 0, 0, 0, 24, 52, 82,
 82, 92, 64, 68, 36, 24, 0
500 DATA 0, 0, 0, 66, 66, 66, 66
, 126, 66, 66, 36, 36, 24, 24
510 DATA 0, 0, 0, 62, 66, 66, 66
, 34, 30, 34, 66, 66, 66, 62
```

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```
520 DATA 0, 0, 0, 24, 36, 66, 2,
 2, 2, 2, 2, 66, 36, 24
530 DATA 0, 0, 0, 30, 34, 66, 66
, 66, 66, 66, 66, 66, 34, 30
540 DATA 0, 0, 0, 126, 2, 2, 2,
2, 62, 2, 2, 2, 2, 126
550 DATA 0, 0, 0, 2, 2, 2, 2, 2,
 62, 2, 2, 2, 2, 126
560 DATA 0, 0, 0, 88, 100, 66, 8
2, 114, 2, 2, 2, 66, 36, 60
570 DATA 0, 0, 0, 66, 66, 66, 66
, 66, 126, 66, 66, 66, 66, 66
580 DATA 0, 0, 0, 28, 8, 8, 8, 8
, 8, 8, 8, 8, 8, 28
590 DATA 0, 0, 0, 8, 28, 34, 34,
 32, 32, 32, 32, 32, 32, 112
600 DATA 0, 0, 0, 66, 34, 18, 10
, 6, 10, 18, 34, 66, 66, 2
610 DATA 0, 0, 0, 126, 2, 2, 2,
2, 2, 2, 2, 2, 2, 2
620 DATA 0, 0, 0, 66, 66, 66, 66
, 66, 90, 90, 102, 102, 66, 66
630 DATA 0, 0, 0, 66, 66, 98, 98
, 82, 82, 74, 74, 70, 70, 66
640 DATA 0, 0, 0, 60, 36, 66, 66
, 66, 66, 66, 66, 66, 36, 60
650 DATA 0, 0, 0, 2, 2, 2, 2, 2,
 62, 66, 66, 66, 66, 62
660 DATA 0, 0, 0, 88, 36, 90, 66
, 66, 66, 66, 66, 66, 36, 24
670 DATA 0, 0, 0, 66, 34, 18, 10
, 6, 62, 66, 66, 66, 66, 62
680 DATA 0, 0, 0, 60, 36, 66, 64
, 32, 24, 4, 2, 66, 36, 60
690 DATA 0, 0, 0, 8, 8, 8, 8, 8,
 8, 8, 8, 8, 8, 62
700 DATA 0, 0, 0, 60, 36, 66, 66
, 66, 66, 66, 66, 66, 66, 66
710 DATA 0, 0, 0, 24, 24, 24, 36
, 36, 36, 36, 66, 66, 66, 66
720 DATA 0, 0, 0, 66, 102, 102,
102, 90, 90, 90, 66, 66, 66, 66
730 DATA 0, 0, 0, 66, 66, 36, 36
, 60, 24, 60, 36, 36, 66, 66
740 DATA 0, 0, 0, 24, 24, 24, 24
, 24, 24, 36, 36, 102, 66, 66
750 DATA 0, 0, 0, 126, 2, 2, 4,
8, 16, 16, 32, 64, 64, 126
760 DATA 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0
770 DATA 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0
780 DATA 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0
790 DATA 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0
```

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```
800 DATA 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0
810 DATA 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0
820 DATA 0, 0, 0, 92, 34, 34, 60
, 32, 32, 28, 0, 0, 0, 0
830 DATA 0, 0, 0, 30, 34, 34, 34
, 34, 34, 30, 2, 2, 2, 2
840 DATA 0, 0, 0, 60, 2, 2, 2, 2
, 2, 60, 0, 0, 0, 0
850 DATA 0, 0, 0, 60, 34, 34, 34
, 34, 34, 60, 32, 32, 32, 32
860 DATA 0, 0, 0, 60, 2, 2, 62,
34, 36, 24, 0, 0, 0, 0
870 DATA 0, 0, 0, 8, 8, 8, 8, 8,
 8, 28, 8, 8, 8, 48
880 DATA 0, 60, 66, 60, 2, 12, 1
8, 18, 50, 76, 0, 0, 0, 0
890 DATA 0, 0, 0, 34, 34, 34, 34
, 34, 34, 30, 2, 2, 2, 2
900 DATA 0, 0, 0, 28, 8, 8, 8, 8
, 8, 12, 0, 8, 0, 0
910 DATA 0, 0, 28, 20, 32, 32, 3
2, 32, 32, 32, 0, 32, 0, 0
920 DATA 0, 0, 0, 34, 18, 10, 6,
 10, 18, 34, 2, 2, 2, 2
930 DATA 0, 0, 0, 28, 8, 8, 8, 8
, 8, 8, 8, 8, 8, 12
940 DATA 0, 0, 0, 42, 42, 42, 42
, 42, 42, 30, 0, 0, 0, 0
950 DATA 0, 0, 0, 34, 34, 34, 34
, 34, 34, 30, 0, 0, 0, 0
960 DATA 0, 0, 0, 28, 34, 34, 34
, 34, 34, 28, 0, 0, 0, 0
970 DATA 0, 2, 2, 2, 30, 34, 34,
 34, 34, 30, 0, 0, 0, 0
980 DATA 0, 64, 32, 32, 60, 34,
34, 34, 34, 60, 0, 0, 0, 0
990 DATA 0, 0, 0, 4, 4, 4, 4, 4,
 44, 26, 0, 0, 0, 0
1000 DATA 0, 0, 0, 60, 64, 64, 6
0, 2, 2, 60, 0, 0, 0, 0
1010 DATA 0, 0, 0, 48, 8, 8, 8,
8, 8, 60, 8, 8, 0, 0
1020 DATA 0, 0, 0, 92, 34, 34, 3
4, 34, 34, 34, 0, 0, 0, 0
1030 DATA 0, 0, 0, 8, 8, 20, 20,
 34, 34, 34, 0, 0, 0, 0
1040 DATA 0, 0, 0, 20, 42, 42, 4
2, 42, 42, 34, 0, 0, 0, 0
1050 DATA 0, 0, 0, 34, 34, 20, 8
, 8, 20, 34, 0, 0, 0, 0
1060 DATA 0, 0, 2, 4, 8, 8, 20,
20, 34, 34, 0, 0, 0, 0
1070 DATA 0, 0, 0, 62, 2, 4, 8,
8, 16, 62, 0, 0, 0, 0
```

The following program is a routine to reverse the data on printers that have a bottom LSB (Least Significant Bit) instead of the top LSB.

Listing 3: LSB DATA

```
10 CLEAR1500:DIMCH$(90)
20 OPEN"I",#1,"SIDWS"
30 FORA=1TO90
40 INPUT#1,CH$(A)
50 NEXTA
60 CLOSE
140 FORA=1TO90:C$="":FORB=1TO14
150 D=ASC(MID$(CH$(A),B,1))-128:
E=0
165 GOSUB500:B$=CHR$(E+128)
170 C$=B$+C$
180 NEXTB:CH$(A)=C$:NEXTA
200 PRINT#-2,CHR$(27)CHR$(20)CHR
$(18)
210 FORA=1TO30:PRINT#-2,CH$(A)CH
R$(128)CHR$(128);:NEXTA:PRINT#-2
220 FORA=31TO60:PRINT#-2,CH$(A)C
HR$(128)CHR$(128);:NEXTA:PRINT#-
2
230 FORA=61TO90:PRINT#-2,CH$(A)C
HR$(128)CHR$(128);:NEXTA:PRINT#-
2
240 INPUT"RECORD";Y$:IFY$<>"Y"TH
ENEND
250 OPEN"O",#1,"RSDWS"
260 FORA=1TO90
270 PRINT#1,CH$(A)
280 NEXTA
290 CLOSE
300 KILL"SIDWS/DAT"
310 RENAME"RSIDWS/DAT"TO"SIDWS/D
AT"
500 IFD>63THENE=1:D=D-64
510 IFD>31THENE=E+2:D=D-32
520 IFD>15THENE=E+4:D=D-16
530 IFD>7THENE=E+8:D=D-8
540 IFD>3THENE=E+16:D=D-4
550 IFD>1THENE=E+32:D=D-2
560 IFD>0THENE=E+64:D=0
570 RETURN
```

Listing 4: ROTATE 2

```
10 '* * * * * * * * * * * * * * *
20 '*          ROTATE            *
30 '*        CREATED BY          *
40 '*        JOHN WEST           *
50 '*      P.O. BOX  386         *
60 '*    DURANT, OK 74702        *
70 '* * * * * * * * * * * * * * *
80 CLS:CLEAR12000:DIMCH$(90),B$(
50)
90 'LOAD GRAPHICS LETTER DATA
100 OPEN"I",#-1,"SIDWS"
110 FORA=1TO90:FORB=1TO14
120 INPUT#-1,C
130 CH$(A)=CH$(A)+CHR$(C+128)'CO
NVERT DATA TO GRAPHICS CODE
140 NEXT B,A
150 CLOSE
160 PRINT#-2,CHR$(27)CHR$(20)CHR
$(18);'SET PRINTER TO CONDENSED
PRINT AND GRAPHICS MODE
170 INPUT"ENTER FILE NAME OF TEX
T";A$
180 INPUT"MAXIMUM # OF COLUMNS";
A:A=A*50'50 LINES PER COLUMN
190 INPUT"# OF SPACES BETWEEN CO
LUMNS";ZZ
200 N=0:GOSUB230
210 IFM<A THENN=N+50:GOSUB250:GO
TO210
220 END
230 OPEN"I",#-1,A$
240 N=1
250 FORX=1TO50:B$(X)="":NEXTX'ER
ASE EXISTING TEXT
260 FOR M=N TON+49
270 IFEOF(-1)THENA=M:GOTO300ELSE
LINEINPUT#-1,D$
280 B$(M-N+1)=D$
290 NEXTM
300 FORX=1TOM-N:IFLL>LEN(B$(X))T
HENNEXTX ELSELL=LEN(B$(X)):NEXTX
'FIND LENGTH OF LONGEST LINE OF
TEXT
310 L=0
320 L=L+1:C$="":D=0
330 FORX=M-N TO1STEP-1'READ FROM
 BOTTOM TO TOP
340 IFL>LL THENZ=ZZ:GOTO400'LAST
 LETTER IN COLUMN HAS BEEN PRINT
ED
350 IFL>LEN(B$(X))THENC=91:GOTO3
70'IF THIS LINE IS SHORTER THAN
POSITION BEING PRINTED THEN INSE
RT BLANK
360 C=ASC(MID$(B$(X),L,1)):IFC<3
3ORC>122THENC=91'INSERT BLANK FO
R UNPRINTABLE CODE
370 C=C-32:PRINT#-2,CH$(C)CHR$(1
28)CHR$(128);'PRINT CHARACTER -
ADD 2 SPACES ON BOTTOM
380 NEXTX
390 PRINT#-2:GOTO320'COMPLETE TH
E LINE
400 IFZ>0THENPRINT#-2:Z=Z-1:GOTO
400'MAKE SPACES BETWEEN COLUMNS
410 RETURN
```

CORRECTIONS

"Receipt Maker and File" (March 1986, Page 22): Bill Tottingham tells us of some needed changes in his program *Receipt File*. In lines 240, 530, 590, 610, 660, 680 and 950, all D$'s need to be changed to Q$'s and all XD$'s need to be changed to XQ$'s.

"An Annual Expense Tracking and Management System" (March 1986, Page 122): Eddie Hill has sent us a letter detailing changes to *Reptgenr* that allow printing more than 50 transactions per month.

1) Add the following line:

```
11127 I=0
```

2) Make appropriate changes in the following lines:

```
11130
I=I+1:GOSUB11900:IFACNO=999THEN1
1140

11140 IF I< >135 THEN 11130 ELSE
PRINT#-2:PRINT#-2:PRINT#-2,TAB(3
0)"TOTAL ---------->
";:PRINT#-2,
USING"$###,###.##-";TT;:PRINT#-2
:TT=0:CLOSE #1:CLOSE
#2:PSW=0:GOTO11910
```

3) Finally, the last part of Line 11230 transfers program control to 1123. This should be 11230.

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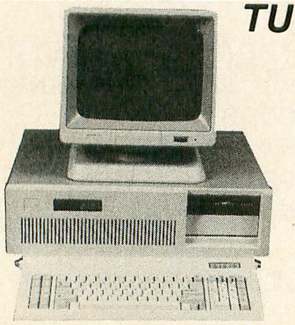

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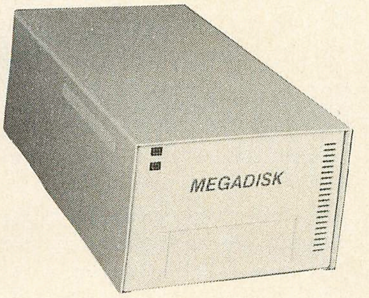

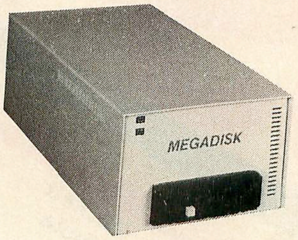

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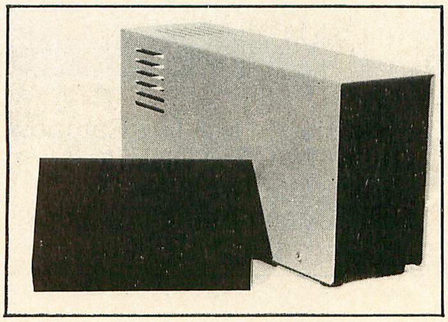

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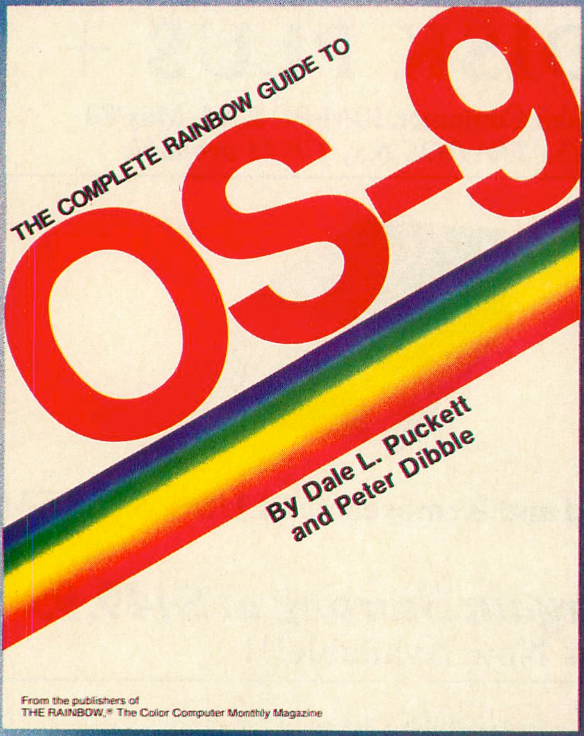
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Using Your CoCo for Educational Plans

By Fred B. Scerbo
Rainbow Contributing Editor

Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. Remember, keep your ideas specific, and don't forget that this is BASIC. All programs resulting from your wishes are for your use but remain the property of the author.

One of the more tedious jobs that people purchase a computer for is to try to save the number of steps involved in preparing reports or other written documents. Whether or not you are accustomed to using a word processor for such tasks often makes little difference when one has to go through the actual process of entering information on the keyboard. What is even more upsetting is when friends know you own a computer, they often ask you to help them do some back-breaking task they don't want to do by hand. Computer or no computer, the information still has to be handled and that takes time.

Needless to say, we all want to find a way to make the maximum use of our limited time. I must confess that I fall into this category. For example, if I am using a word processor to type up something simple like a mailing list that repeats many of the same cities, states and ZIP codes, I often use a simple abbreviation for these items. The abbreviation may only be one or two characters long. Later, I use the FIND/CHANGE routine of the word processor to run through the text and change my code of NA to North Adams, MA 01247 wherever it is found in the list. I also use M/M for Mr. and Mrs. and later use the same procedure to correct the text.

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

Sound lazy? Sure it is, but that's one of the beauties of using a microcomputer or word processor. You are able to get the maximum product out of the fewest keystrokes, providing, of course, that you have software to suit the purpose.

Anyone who works in business or education knows there are always reports to be filed that must meet the requests of an administrator who has specific objectives in mind. With this need in mind, this month's "Wishing Well" offers a solution to the problem with *Objective File*.

The Background Setting

Several years ago, the federal government passed a landmark piece of legislation called Public Law 94-142. PL 94-142 was roughly based on a similar piece of legislation that had been in effect in Massachusetts, known as Chapter 766. What both laws deal with is the rights of handicapped students and their parents within a public school system. Both laws have ensured that students with learning disabilities, emotional problems or some other identifiable handicap can receive a free public education tailored to that student's individual needs. The philosophy behind both laws is, "If the child can't learn the way we teach, then we have to teach the way the child learns!"

There is one catch, however. Both laws require that each student served be educated according to a specific educational plan consisting of general and specific behavioral objectives. For those not familiar with this educational jargon, a behavioral objective is a very specific goal that is set and can be measured. To give you some feel for what this is, take a look at these two goals:

1) John will earn a grade of 95 on all his addition tests.

2) John will learn to respect the values and traditions of his community and society as a whole.

The first objective is a behavioral objective because it can be measured. John either does or does not earn at least a 95 on his tests. You can tell whether or not you have succeeded with little difficulty. The second objective is a little more complex and in no way easily measurable. How can we tell if John is respecting the values of society? Whose values will we use? What if the standards in his community change? In other words, number two just does not cut it as a behavioral objective.

Let's see if you can tell this with the following examples.

1) Sue will correctly measure all the ingredients to prepare eight servings of macaroni and cheese and present the finished product to her classmates.

2) Sue will prepare delicious meals for her class.

Which one is a behavioral objective? Number one is, because we can measure the behavior or product. In number two, we would run into a problem with deciding what delicious is.

Although the law requires these objectives to be used, they are still a very controversial issue in education since the objectives and educational plans take a considerable amount of time to prepare. Some argue that the time could be better spent working with the students.

While there are merits to both sides of this argument, the fact remains that these objectives must be prepared. When working with students of very limited abilities, the objectives are easier to write. (Bill will learn to tie both shoes without help.) However, when we get to emotional issues, they may be much harder to write. (Bill will show that he is ready to eat with his classmates by not stabbing his fellow student with a fork.) As you can see, this can be a little tricky.

The Wish

I have dealt with many teachers who prepare objectives such as these for a number of different subjects and naturally they all want a way to make this task easier. Not being the most energetic person in the world myself, I was also looking for ways to make this work load a little lighter.

The result of this wish is the program, *Objective File*, which works entirely from BASIC with or without a disk drive. In order to use *Objective File*, you need a line printer of some type. I have written the program to work with any standard 80-character printer. The program prevents word breakup, both on the screen and on the printed copy.

Using the Program

In order to use *Objective File*, first realize what it is designed to do. The program does not write your behavioral objectives for you. Instead, it allows the creation of a "cookbook" of objectives that you are likely to use more than once. It allows you to call these objectives either by number or by scanning through the entire file.

Whenever an objective is selected, the name of the student in question is inserted wherever it is needed. Therefore, in order to use this program, the objectives must have been designed in advance. It takes a little time and effort to learn to write objectives without the pronouns him, her, his and hers. This might seem difficult at first but you will be surprised to find that perfectly grammatical sentences can be constructed without them.

If you need to use him or her, you might choose to use him/her. This looks a little too computerized for most people, however. We have to keep in mind that this program is just an aid and not a substitute for creativity in education. Every plan usually requires that I create some new objectives since I am dealing with an individual student and not a machine. When that happens, I just add them to the existing file.

> ***". . . that's one of the beauties of using a microcomputer or word processor. You are able to get the maximum product out of the fewest keystrokes . . ."***

All of the objectives are saved in `DATA` statements starting with Line 1000. Therefore, when using the program, you do not need to load in any files. At the same time, resave the entire program whenever adding new objectives to the program. In writing an objective for the file, use the name STUDENT whenever the name of the student is to appear in the objective. It is also important that only one objective is put in each `DATA` line. Another good idea is to wrap each objective in quotation marks. Therefore, one of the objectives might read:

```
 1160 DATA "GIVEN A REVIEW QUIZ
IN SOCIAL STUDIES, STUDENT WILL
OBTAIN A GRADE OF 70% OR HIGHER."
```

You may choose to use both upper- and lowercase when typing in the objectives. However, be sure that the name STUDENT is in all caps.

When the program is run, pressing ENTER gives the three-choice menu. The program prints out a list of all the objectives in the file for later reference by number. Use Option B for this.

If you have a list of the objectives on file and know which numbers you want, choose Option A to select objectives. Entering the number of the objective wanted causes it to appear on the screen. If the objective is not the correct one, select another.

Using Option C, scan objectives, allows flipping through all the objectives one at a time and selecting the ones wanted. If you do not select any, or press '@', you are returned to the appropriate menu. Entering no number when in the select mode also returns you to the appropriate menu.

In either case, if the objective is the correct one, you are asked which quarters you want checked. PL 94-142 and CH. 766 require that objectives be addressed during a given semester or quarter of the year. Using either 'Y' or 'N' indicates in which quarters the objective is to be addressed. If, for some reason, you do not want to include this section, delete lines 200-220 and 360-375. They will appear on neither the screen nor the printed copy. The final question asked is:

```
IS THIS CORRECT (Y/N)?
```

This gives one last chance to make any corrections. Pressing 'N' completely strikes that objective and lets another be chosen. Again, if you want to stop, simply press ENTER when asked for a number in Option A or say no to `ANOTHER COPY Y/N?` or press '@' when in Option C.

Printing Your Objectives

Once all the objectives are selected, whether it is with Option A or C, proceed to the printing of the objectives. Enter the student's first name and then the student's last name. Be sure the line printer is turned on and loaded with paper. The program prints out a list of the objectives that were selected with the student's name substituted at the appropriate places. The quarters the

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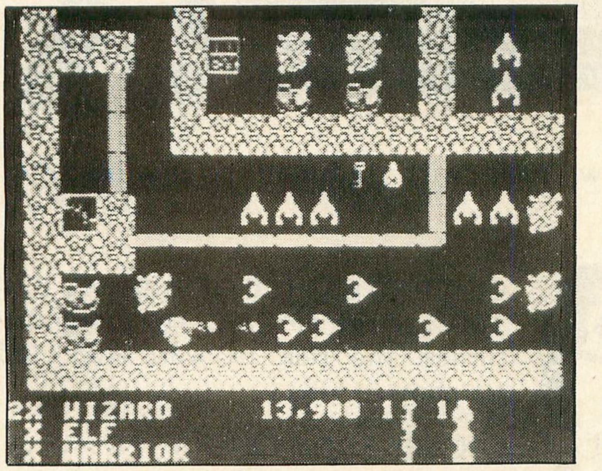
GANTELET



One, two or even three people can play Gantelet at the same time. You and your friends travel through the many levels in search of an exit to the next level. Avoid the Ghosts and other creatures that are out to stop you in your quest. Collect keys to open doors, treasures and magic potions to aid you in your battle. Watch out for hidden traps as you frantically search for the exit to the next level.

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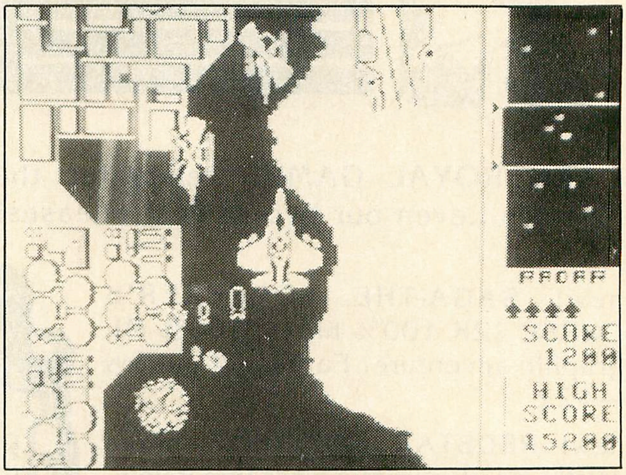

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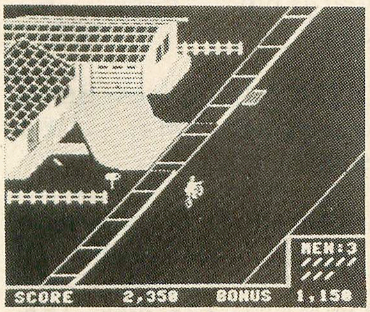

As a paper boy, you ride your bike along your route delivering papers to your customers. Break customers' windows or damage their property and they will cancel their subscriptions! Earn bonus points by damaging non-subscribers' property. Avoid pedestrians, cars, and maybe even a mad dog in your attempt to deliver all of your papers! Detailed graphics and lots of surprises make this game a real challenge for everyone.

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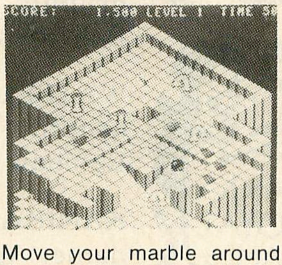
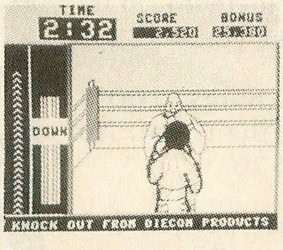
MARBLE MAZE



Move your marble around the mazes in your search for the finish line! Avoid marble eaters, acid puddles and other creatures that inhabit the mazes. Eight different levels and great graphics make this game a must for your collection.

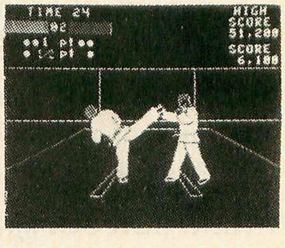
joystick required

KNOCK OUT



Fight against five different boxers in this great boxing game! At first the boxers are easy to knock out, but beware, it gets harder as you move on. The boxers are out to stop you in your quest to become champion of the world. Outstanding graphics make this a must for your collection!

KARATE



Challenge the computer, or a friend to a Karate match! Use various Karate punches and kicks to knock your opponent down and earn points to win the match. When challenging the computer, your opponent's Karate skills increase as you win matches. This game is a challenge for even the expert game player.

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objectives are to be addressed are printed below each objective. The program pauses after each objective, awaiting a response and allows printing of extra copies if needed.

Keep in mind that the form printed by this program does not constitute an approved Individual Educational Plan or IEP as required by federal law. An IEP is a very specific document and the specific behavioral objectives in the IEP are only one part of a very complex document. An IEP often contains testing information, psychological reports and observations, medical information, general goals, and teaching materials and methodologies. Most school systems have a clerical aide who must prepare all this information from up to a dozen different individuals in one document. A program like this can save a lot of time for an instructor who might have to submit pages of handwritten objectives to a central office aide.

Granted, there are some software packages available that write entire IEPs with a microcomputer, but the ones I have seen have been too limited in their flexibility to deal with the complex planning for an individual student. Using a program such as this simply helps speed up the process without taking over the entire process.

Does all this work with objectives seem like a paper chase? Well, welcome to one of the most controversial issues in education today. Still, if a program like this can help an educator spend more time with students while meeting the letter of the law, then great.

Other Uses

Objective File need not be used just by special educators. Any teacher can use the program to generate objectives for entire classes as well. Simply enter `THE CLASS` as the student's first name and nothing as the last name.

Business executives who wish to file objectives can make changes in some of the headings such as STUDENT NAME by altering the program as needed. (See the deletions mentioned earlier.) You can change the string name STUDENT in Line 280 to any term wanted (i.e., INDIVIDUAL, EXECUTIVE, COMPANY, etc.). You may then substitute these in the objectives written for the `DATA` statements. Keep in mind that the form printed will not be the final copy, but a listing of objectives for a typist to incorporate into a larger document. You be the judge of how it is used.

Conclusion

While this month's program may not be applicable to a large number of you, I think the structure behind it is worth examining. It is a real timesaver to some in education. More importantly, though, is the fact that it shows you can accomplish some amazing things in BASIC if you really put your mind to it. ☐

The listing: `OBJECTIV`

```
10 '*****************************
15 '*      OBJECTIVE FILE       *
20 '*     BY FRED B.SCERBO      *
25 '*    COPYRIGHT (C) 1986     *
30 '* 60 HARDING AV.N.ADAMS,MA *
35 '*****************************
40 CLEAR2000
45 CLS0:FORI=1TO 320 :READ A:PRI
NTCHR$(A+128);:NEXT
50 DATA99,99,98,99,99,98,99,99,9
9,99,98,99,99,99,96,99,99,98,99,
99,99,99,97,99,98,99,,97,98,99,9
9,99
55 DATA106,,106,101,,106,,,101,1
06,,101,,100,96,106,,106,106,101
,106,101,,111,,101,,101,,101,,10
0
60 DATA106,,106,101,99,107,96,98
,101,106,,101,99,99,96,106,,104,
104,101,106,100,,111,,101,,101,,
101,99,99
65 DATA106,,106,101,96,101,,106,
101,106,,101,,96,96,106,,96,,101
,106,,,111,,101,98,103,,101,,
70 DATA106,,106,101,,101,,106,10
1,106,,101,,101,,106,,106,,101,1
06,,,111,,,106,106,96,101,,101
75 DATA108,108,104,108,108,108,,
108,108,104,,108,108,108,,108,10
8,104,100,108,108,64,100,108,104
,,100,96,96,108,108,108
80 DATA58,42,,,77,78,76,76,76,77
,,77,78,,,77,78,,,,68,79,76,76,7
6,76,74,,,,37,53
85 DATA58,42,,,69,75,67,67,,68,,
69,74,,,69,74,,,,,79,67,67,67,64
,64,,,,37,53
90 DATA58,43,35,34,69,74,,,,,,69
,74,,,69,74,,,66,64,79,,,,64,66,
35,35,35,39,53
95 DATA59,51,51,50,71,75,66,,,,6
4,71,75,64,64,71,75,67,67,74,65,
79,67,67,67,67,74,51,51,51,51,55
100 PRINT@390,"  BY FRED B.SCERB
O  ";
105 PRINT@422," COPYRIGHT (C) 19
86 ";
110 X$=INKEY$:IFX$<>CHR$(13)THEN
110
115 DIM O$(40),Q(40,4)
120 CLS:FORI=1TO6:PRINT:NEXT
125 PRINTTAB(4)"A) SELECT OBJECT
IVES"
130 PRINTTAB(4)"B) PRINTOUT OBJE
CTIVES"
135 PRINTTAB(4)"C) SCAN OBJECTIV
ES"
140 X$=INKEY$:IFX$="A"THEN145ELS
EIFX$="B"THEN410ELSEIFX$="C"THEN
455ELSE140
145 CLS:RESTORE:FORI=1TO320:READ
A:NEXT:INPUT"ENTER OBJECTIVE #";
Z:PRINT:IFZ=0THEN250
150 OJ=OJ+1:FORI=1TOZ:READ A$:IF
 A$="END"THENPRINT:PRINT"YOU DON
'T HAVE A NUMBER THAT    HIGH IN
```

```
 THE FILE.":FORP=1TO1000:NEXT:GO
TO245
155 NEXTI:O$(OJ)=A$
160 WW=LEN(A$):IFWW<31THEN180
165 FORJ=31 TO0STEP-1
170 IF MID$(A$,J,1)<>" "THENNEXT
175 L$=LEFT$(A$,J-1):A$=RIGHT$(A
$,WW-J):PRINTL$:GOTO160
180 PRINTA$:PRINT
185 PRINT"IS THIS THE ONE (Y/N)?
"
190 X$=INKEY$:IFX$="Y"THEN200ELS
EIFX$="N"THEN195ELSEIFX$="@"THEN
480ELSE190
195 OJ=OJ-1:IF SC=1THEN460ELSE14
5
200 FORY=1TO4:PRINT"CHECK QUARTE
R #";Y;" (Y/N)";
205 X$=INKEY$:IFX$="Y"THEN210ELS
EIFX$="N"THEN215ELSE205
210 PRINT" Y":Q(OJ,Y)=1:GOTO220
215 PRINT" N":Q(OJ,Y)=0
220 NEXTY
225 PRINT:PRINT"IS THIS CORRECT
(Y/N)?"
230 X$=INKEY$:IFX$="Y"THEN235ELS
EIFX$="N"THEN240ELSE230
235 IFSC=1THEN480ELSE145
240 IF SC=1 THEN A$=Z$:GOTO470
245 OJ=OJ-1:GOTO145
250 IF OJ<=1THEN RUN
255 CLS:PRINT"ENTER STUDENT'S FI
RST NAME":PRINT:PRINT"=> ";:LINE
INPUT PL$
260 PRINT
265 PRINT"ENTER STUDENT'S LAST N
AME":PRINT:PRINT"=> ";:LINEINPUT
 LN$
270 FOR D=1TO OJ
275 WW=LEN(O$(D)):SL=LEN(PL$):FO
RK=1TOWW
280 IF MID$(O$(D),K,7)<>"STUDENT
"THEN290
285 FG$=LEFT$(O$(D),K-1):FH$=RIG
HT$(O$(D),WW-K-6):O$(D)=FG$+PL$+
FH$:GOTO295
290 NEXTK
295 NEXTD
300 Z=0:PRINT#-2,"EDUCATIONAL PL
AN FOR ";PL$;" ";LN$:PRINT#-2,"
":PRINT#-2,"SPECIFIC EDUCATIONAL
 OBJECTIVES":PRINT#-2," ":PRINT#
-2,"GOAL/OBJ"
305 PRINT#-2," "
310 Z=Z+1:IFZ>OJ THEN395
315 A$=O$(Z)
320 PRINT#-2,"   ";:PRINT#-2,USI
NG"###.";Z;:PRINT#-2," ";
325 CLS4:PRINT@192,STRING$(32,"*
");"      NOW PRINING OBJECTIVES
   ";STRING$(32,"*");
330 WW=LEN(A$):IFWW<70THEN355
335 FORJ=70 TO0STEP-1
340 IF MID$(A$,J,1)=" "THEN350
345 NEXTJ
350 L$=LEFT$(A$,J-1):A$="
 "+RIGHT$(A$,WW-J):PRINT#-2,L$:G
OTO330
355 PRINT#-2,A$:PRINT#-2," "
360 PRINT#-2,TAB(8)"QUARTERS CHE
CKED: ";
365 FORU=1TO4:IF Q(Z,U)=1 THEN P
RINT#-2,U" - YES   ";
370 IF Q(Z,U)=0 THEN PRINT#-2,U"
 - NO   ";
375 NEXTU:FORU=1TO4:PRINT#-2," "
:NEXTU
380 CLS7:PRINT@192,STRING$(32,"=
");" PRESS <ENTER> FOR NEXT CHOI
CE  ";STRING$(32,"=");
385 X$=INKEY$:IFX$=CHR$(13)THEN3
90ELSE385
390 CLS5:GOTO310
395 CLS6:PRINT@192,STRING$(32,"#
");"     ANOTHER COPY (Y/N) ?
   ";STRING$(32,"#");
400 X$=INKEY$:IFX$="Y"THEN300ELS
EIFX$="N"THEN405ELSE400
405 RUN
410 CLS:FORI=1TO6:PRINT:NEXT:PRI
NTTAB(6)"NOW PRINTING LIST"
415 K=0
420 K=K+1:READ A$:IFA$="END"THEN
 RUN
425 PRINT#-2,"   ";:PRINT#-2,USI
NG"###.";K;:PRINT#-2," ";
430 WW=LEN(A$):IFWW<70THEN450
435 FORJ=70 TO0STEP-1
440 IF MID$(A$,J,1)<>" "THENNEXT
445 L$=LEFT$(A$,J-1):A$="
 "+RIGHT$(A$,WW-J):PRINT#-2,L$:G
OTO430
450 PRINT#-2,A$:PRINT#-2," ":GOT
O420
455 CLS:KK=0:SC=1
460 KK=KK+1:READ A$:IFA$="END"TH
EN490
465 OJ=OJ+1:O$(OJ)=A$:Z$=A$
470 CLS:PRINT"SCANNING OBJECTIVE
 #";KK:PRINT
475 GOTO160
480 PRINT"ANOTHER (Y/N) ?";
485 X$=INKEY$:IFX$="Y"THEN460ELS
EIFX$="N"THEN250ELSE485
490 IF OJ=0 THEN RUN
1000 REM START OBJECTIVES HERE
 '
 '
```

```
'
1010 DATA "GIVEN A SET OF TWO DI
GIT ADDITION PROBLEMS, STUDENT W
ILL COMPLETE EACH WITH 90% ACCUR
ACY."
1020 DATA "GIVEN A SET OF THREE
DIGIT ADDITION PROBLEMS, STUDENT
 WILL COMPLETE EACH WITH 90% ACC
URACY."
1030 DATA "GIVEN A SET OF FOUR D
IGIT ADDITION PROBLEMS, STUDENT
WILL COMPLETE EACH WITH 90% ACCU
RACY."
1040 DATA "GIVEN A SET OF TWO DI
GIT SUBTRACTION PROBLEMS, STUDEN
T WILL COMPLETE EACH WITH 90% AC
CURACY."
1050 DATA "GIVEN A SET OF THREE
DIGIT SUBTRACTION PROBLEMS, STUD
ENT WILL COMPLETE EACH WITH 90%
ACCURACY."
1060 DATA "GIVEN A SET OF FOUR D
IGIT SUBTRACTION PROBLEMS, STUDE
NT WILL COMPLETE EACH WITH 90% A
CCURACY."
1070 DATA "GIVEN A SET OF TWO DI
GIT MULTIPLICATION PROBLEMS, STU
DENT WILL COMPLETE EACH WITH 90%
 ACCURACY."
1080 DATA "GIVEN A SET OF THREE
DIGIT MULTIPLICATION PROBLEMS, S
TUDENT WILL COMPLETE EACH WITH 9
0% ACCURACY."
1090 DATA "GIVEN A SET OF FOUR D
IGIT MULTIPLICATION PROBLEMS, ST
UDENT WILL COMPLETE EACH WITH 90
% ACCURACY."
1100 DATA "GIVEN A SET OF TWO DI
GIT DIVISION PROBLEMS, STUDENT W
ILL COMPLETE EACH WITH 90% ACCUR
ACY."
1110 DATA "GIVEN A SET OF THREE
DIGIT DIVISION PROBLEMS, STUDENT
 WILL COMPLETE EACH WITH 90% ACC
URACY."
1120 DATA "GIVEN A SET OF FOUR D
IGIT DIVISION PROBLEMS, STUDENT
WILL COMPLETE EACH WITH 90% ACCU
RACY."
1130 DATA "GIVEN A REVIEW QUIZ I
N MATHEMATICS, STUDENT WILL OBTA
IN A GRADE OF 70% OR HIGHER."
1140 DATA "GIVEN A TEST IN MATHE
MATICS, STUDENT WILL OBTAIN A GR
ADE OF 70% OR HIGHER."
1150 DATA "GIVEN A TOPIC IN SOCI
AL STUDIES, STUDENT WILL CONSTRU
CT A ONE-PAGE REPORT ANSWERING T
EACHER QUESTIONS."
1160 DATA "GIVEN A REVIEW QUIZ I
N SOCIAL STUDIES, STUDENT WILL O
BTAIN A GRADE OF 70% OR HIGHER."
1170 DATA "GIVEN A REVIEW TEST I
N SOCIAL STUDIES, STUDENT WILL O
BTAIN A GRADE OF 70% OR HIGHER."
1180 DATA "GIVEN A COMPUTER REVI
EW PROGRAM IN SOCIAL STUDIES, ST
UDENT WILL OBTAIN A GRADE OF 70%
 OR HIGHER."
1190 DATA "GIVEN A LIST OF SPELL
ING WORDS IN SOCIAL STUDIES, STU
DENT WILL CORRECTLY SPELL NO FEW
ER THAN 70%"
1200 DATA "GIVEN A LIST OF TERMS
 IN SOCIAL STUDIES, STUDENT WILL
 CORRECTLY DEFINE NO FEWER THAN
70%"
1210 DATA "GIVEN A MAP IN SOCIAL
 STUDIES, STUDENT WILL CORRECTLY
 LOCATE NO FEWER THAN 70% OF TEA
CHER DESIGNATED AREAS."
1220 DATA "GIVEN A ROAD MAP IN S
OCIAL STUDIES, STUDENT WILL CORR
ECTLY MAP OUT A TRAVEL ROUTE BET
WEEN TWO GIVEN LOCATIONS."
5000 DATA END
```

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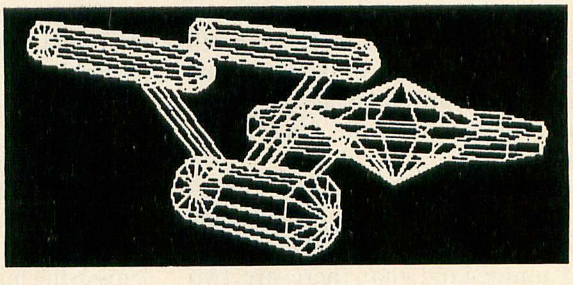

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EDUCATION NOTES

16K ECB

Teaching Children Time Concepts

By Steve Blyn
Rainbow Contributing Editor

It's 9:15 a.m. The postman has just delivered your latest copy of THE RAINBOW magazine. Of course, you immediately begin to read it. If you read continuously for the next two hours and 15 minutes, what is the new time?

This month's article and program deal with problems demonstrated by the paragraph above. This type of math verbal problem deals only with time changes. These problems are generally taught and mastered in grades five through seven.

Before beginning these kinds of problems, students must have a clear understanding of telling time. The student should understand that there are two sets of 12 hours in each day and that 60 minutes comprise each hour. This knowledge is a necessary prerequisite to solving these problems. The a.m. and p.m. concepts should also have been taught.

A good approach to mastering any type of verbal problem is to begin from the easy and proceed to the more complex. Using only hours is a good start. If it is 5:00 now, what time will it be in two, four or six hours? A play clock with movable hands is useful to many students. If this is unavailable, a watch or wall clock can be used.

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

The first truly difficult part of this concept comes when we give a problem that goes past 12:00 to 1:00. Children are used to thinking in terms of base 10. Their natural inclination is to advance or carry or do some alteration when reaching the number 10 rather than 12. Using a real or play clock helps in understanding the truth of the clock's mathematics.

The next step could be to give problems using minutes in half of them. Such as: If Mr. Brown left New York in his car at 2:00 and traveled for three hours and 20 minutes, at what time did he stop driving? If Sally began practicing piano at 3:45 and practiced for two hours, when did she stop practicing?

Gradually introduce problems that go beyond 12:00. Intersperse them with easier problems that remain within one 12-hour clock span. We don't want to overwhelm students who may have difficulty mastering this one part of the concept.

Next we can use minutes in both parts of the problem. The problem that began this article is one of this type. These are the type of problems used in *Newtime*, our program this month. Additionally, I have chosen to limit all of the program's problems to five-minute rather than one-minute intervals.

For example, the program will not choose a time such as 3:18 — either 3:15 or 3:20 is used. I did this as sort of a middle ground of difficulty. We wanted the level of this program to serve the greatest amount of students. You may, of course, alter the program to not include this rounding off feature by removing the `*5` on lines 100 and 120.

A final step in the learning of this concept is to work backwards in time. We did not choose to include this in our program because it is really a more difficult aspect than we cared to pursue. It would ask questions such as: If Mr. Falk drove his car for three and one-half hours until 4:15, what time did he begin his trip?

These problems require a greater degree of conceptualization on the part of the student. If your child is ready for it, however, go right ahead and challenge his learning powers.

The program randomly chooses a current hour and minute. The minutes are always intervals of five. The current time is chosen on lines 90 and 100 as variables 'A' and 'B'. The amount of time to pass is randomly chosen on lines 110-120 as variables 'C' and 'D'. The student is asked to tell the new time.

The new time is represented by variables 'E' and 'F'. They are the sum of A plus C and B plus D with corrections for "time arithmetic" taken into account. By this we mean that every 60-minute interval must be converted into one additional hour and the hours must be converted to their true values when the sum of hours passes 12. Variables 'E' and 'F' take these factors into account on lines 200-230.

The student's answer is represented by G$ and H$. These strings are converted to 'G' and 'H'. The reason we use G$ to get the answer rather than 'G' is for programming ease. For example, using LINEINPUT G$ on Line 260 rather than INPUT G allows for greater variety of students' answers without accidentally or purposely changing the screen.

The answer is considered correct if the values for 'G' and 'H' match those of 'E' and 'F'. The program compares these values and prints either a "correct" or a "sorry" response on lines 310-320. Lines 330-350 correctly print out the new time.

The program presents 10 problems in each round. The child is told whether he is correct after each response and the correct answer is displayed at the bottom of the screen for extra reinforcement. A report card is given after each group of 10 problems. The child or the next student is then free to begin again.

We at Computer Island hope this program helps your child or students. Please feel free to alter the program in any way that will better help them. By changing the ranges of the various random numbers, you can make this an easier or more difficult program. ☐

The listing: NEWTIME

```
10 REM"SO WHAT'S THE NEW TIME?"
20 REM"*STEVE BLYN,C/O COMPUTER
ISLAND,NY,1986"
30 CLS
40 CT=CT+1
50 IF CT=11 THEN 390
60 PRINT"#=";CT"
    *="CR
70 PRINTSTRING$(32,191);
80 Z=0
90 A=RND(12):'CHOOSE THE HOUR
100 B=RND(10)+1:B=B*5:'KEEP TO 5
 MINUTE INTERVALS
110 C=RND(5)+1
120 D=RND(11)*5
130 PRINT@69,"THE TIME IS NOW";
140 PRINT@101,STRING$(22,131);
150 PRINT@85,A;
160 PRINT@88,B
170 PRINT@88,":";
180 PRINT@163,"WHAT WILL THE NEW
 TIME BE"
190 PRINT@192,C"HOURS AND"D"MINU
TES LATER?"
200 F=B+D:IF F>59 THEN F=F-60:Z=
1
210 E=A+C:IF E>12 THEN E=E-12
220 IF Z=1 THEN E=E+1:'FLAG TO I
NCREASE HOURS BY 1 IF MINUTES AR
E GREATER THAN 59
230 IF E=13 THEN E=1
240 PRINT@301,STRING$(5,131)
250 PRINT@269,"";
260 LINEINPUT G$
270 PRINT@271,":";
280 LINEINPUT H$
290 G=VAL(G$):H=VAL(H$)
300 PRINT@332,"";
310 IF G=E AND H=F THEN PRINT"CO
RRECT":CR=CR+1:PLAY"L50DFGDFGGG"
:GOTO 330:'COUNTER FOR CORRECT A
NSWERS
320 PRINT" SORRY"
330 PRINT@389,"THE NEW TIME IS";
:PRINTUSING"###";E;
340 IF F=0 THEN PRINT"000" ELSE
IF F=5 THEN PRINT"005" ELSE PRIN
TUSING"###";F
350 PRINT@407,":";
360 PRINT@454,"PRESS ENTER TO GO
 ON"
370 EN$=INKEY$:IF EN$=CHR$(13) T
HEN 30
380 GOTO 370
390 PLAY"L50CEGCEG"
400 PRINT@416,"YOUR SCORE THIS R
OUND WAS";CR*10"%";
410 PRINT@483,"PRESS ENTER TO BE
GIN AGAIN";
420 EN$=INKEY$
430 IF EN$=CHR$(13) THEN RUN
440 GOTO 420
```

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Living with texts tailored for . . .

Education Texas Style

By Michael Plog, Ph.D.
Rainbow Contributing Editor

When most of us think of Texas, a few standard images come to mind. The landscape is barren, dusty and dry. Oversized hats fit on oversized people who fit on oversized horses. Maybe most important to the people reading this, Tandy Company is there and our Color Computers (yours and mine) were designed, if not totally made, in that larger-than-life state.

Texas, however, has some other features that directly affect education throughout the country. Texas, along with a few other states, controls much of the content of the textbooks that educational publishers distribute to the entire country. The reason for this is the Texas Education Agency, the state education department, maintains lists of approved textbooks. All districts in Texas must purchase their textbooks based on this list. Curriculum for each content area is determined by the Texas Education Agency, and specifications for textbooks are provided to publishers who want to be on the list. And publishers do indeed want to be on the list. Texas has 1100 school districts and millions of dollars to spend for books. A publisher wanting to sell a textbook in Texas must insure that it conforms to the state-determined specifications.

Therefore, the rest of the country must live with texts tailored for Texas and a few other large states like California, which also have approved lists of textbooks. Nationwide, the market for computer literacy textbooks may be as much as $40 or $50 million. It's no wonder publishers are so anxious to please the Texas consumer.

A few years ago, Texas examined its entire school curriculum. Part of that examination dealt with computer literacy. The Texas state legislature mandated that all students must pass a one-semester computer literacy course before entering the ninth grade. This mandate went into effect in the 1985-86 school year that is just now ending.

The Texas Education Agency went about determining the curriculum in an appropriate manner. They spent a year and a half considering the issues. Testimony was heard from experts in the field, as well as non-experts. The result is a definition of the essential elements of a computer literacy course.

The new law states that textbooks must provide materials to help students use computers for problem-solving purposes. The emphasis is placed on the role of tool applications: word processing, database management and spreadsheet programs. Less importance is placed on learning a computer language, but BASIC is sanctioned over other languages.

According to reports from publishers, this step by Texas is appreciated. Publishers and authors had viewed the computer textbook field with some hesitation. Computer books generally have an extremely short shelf life. New software, hardware and applications make a computer book outdated soon after publication. This publishing nightmare has eased somewhat during the

---

Michael Plog received his doctorate degree from the University of Illinois. He has taught social studies in high school, worked in a central office of a school district and currently is employed at the Illinois State Board of Education.

past few years, but the life span of a computer book is still shorter than for other curriculum areas. The Texas law changes that short shelf life problem to some degree. Innovations in hardware and software may be fine for the business consumer, but eighth-grade students in Texas will continue to learn tool applications for computer literacy.

By the way, 13 textbook publishers wanted to be on the approved list for Texas. Five or six (I am not sure of the exact number) are approved. Each approved textbook has about the same content as the others. Very few differences exist from book to book. That may be expected, with the Texas law guiding the course of study. Every book has a section on BASIC; none have anything on LOGO or PASCAL. All address the issues and topics provided in the Texas law.

Because of the length of time it takes to put a book on the market, most Texas classrooms have no computer textbooks this year. That should change next year when schools have a chance to purchase books over the summer.

The end result of all this is that Texas has assumed a leadership role in school computer literacy. That isn't surprising, since Texas is also the place where the Color Computer originated. Leadership may come easy to those oversized people wearing oversized hats. My feelings about the actions of Texas, however, are mixed.

In general, the decisions made by the Texas Education Agency match my own personal preferences. Programming a computer is not as important as knowing an application to solve a problem. Viewing the computer as a tool is the most appropriate way to approach computer literacy. If a student does want to learn programming, BASIC is probably the best language to learn simply because the machine comes with BASIC already sitting in ROM. Thus, I think Texas made the correct decisions about curriculum emphasis and approach to learning.

My difficulty with the Texas action involves diversity of curriculum. It is true that too much diversity can be harmful to a field of learning. A content area needs to have an accepted core of knowledge that people can understand as the basic components. My difficulty is that with an established, state-wide curriculum, diversity is not simply reduced, it is eliminated.

Some diversity in curriculum is a positive feature for a field of study. A list of approved textbooks and established curriculum stifles creativity and expansion of knowledge in a subject area. It becomes difficult for new information to enter the field. Once a curriculum becomes institutionalized it is hard to change.

Some consistency of course content is necessary in any field of study, but there should be room for diversity too. While I agree with the decisions of direction made by the Texas Education Agency, I would prefer to see a wider variety of content in the textbooks.

Good teachers do not rely solely on textbooks as instructional materials for students. The actions by Texas, however, will make it more difficult for teachers to find additional materials for their classes.

Your thoughts, opinions and ideas about my comments are always welcome. You can contact me at 829 Evergreen, Chatham, IL 62629. Hope to see you at RAINBOWfest in Chicago.

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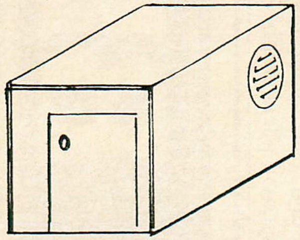

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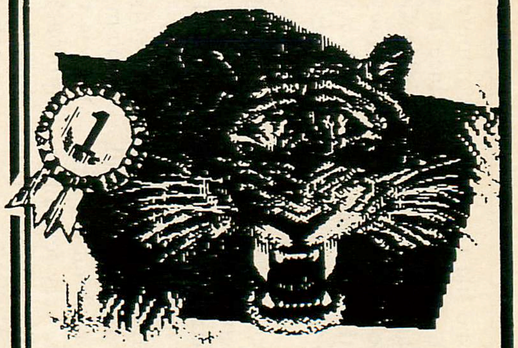

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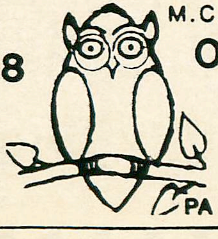

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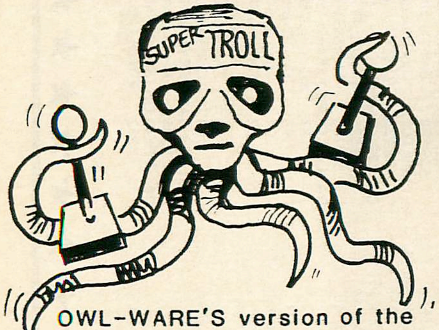

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510	★Laura Knolhoff, Sterling, IL

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3,851	★Michael Wolcheski, Meriden, CT
3,056	Matthew Nelson, Endwell, NY
1,954	Steven Bullard, Allen, OK
1,788	Wil Sappenfield, Allen, OK
1,518	Roy Geeo, Hot Springs, AR

AMPHIBIA (THE RAINBOW 8/85)

11,200	★Daniel Bisbee, Chesterfield, MA

ANDRONE *(Radio Shack)*

58,200	★Scott Bellman, Bettendorf, IA
57,300	Mitch Hart, Seattle, WA
54,300	Daphnie Phillips, Evansville, WI
27,950	Mike Tindall, Manitowoc, WI

ASTRO BLAST *(Mark Data)*

63,125	★Edward Vogel Sr., Pittsburgh, PA
53,950	Bill Fritsch, Whitehall, PA

ATOM *(Radio Shack)*

54	★Brent Heaton, Anderson, SC
54	★R.T. Jenner, Boscobel, WI
53	Alan Drazen, Longwood, FL

BATS AND BUGS (THE RAINBOW, 7/84)

24,600	★Michael Rosenberg, Prestonburg, KY
4,400	Jon Hobson, Plainfield, WI
3,050	Jay Lose, Gulfport, MS
3,000	Michael Scott, Johnstown, NY
2,500	Steven Bullard, Allen, OK

BEAM RIDER *(Spectral Associates)*

4,969,060	★James Oakley, Nashville, TN

BIRD ATTACK *(Tom Mix)*

98,950	★Pascal Ranchon, Richmond, Quebec

BLACKBEARD'S ISLAND *(NOVASOFT)*

78	★Roy D. Grant, Toledo, OH
79	Jeff Roberg, Winfield, KS

BLOC HEAD *(Computerware)*

194,800	★Gordon Rock, Davenport, IA

BOXING *(Diecom Products)*

152,060	★Rush Caley, Port Orchard, WA

BREWMASTER *(NOVASOFT)*

279,600	★Alan Drazen, Longwood, FL
216,350	Jean-Francois Morin, Loretteville, Quebec
166,175	Scott Purrone, Roselle Park, NJ
98,875	Chris Cope, Central, SC
98,700	Jon Sowle, Sanford, FL
97,600	Gordon Rock, Davenport, IA

BUBBLE WARS (THE RAINBOW 2/86)

24,400	★Daniel Cecil, Bardstown, KY
14,881	Tandy Carter Jr., Atwater, CA

BUSTOUT *(Radio Shack)*

37,900	★Gordon Rock, Davenport, IA
21,850	Charles Egglesfield, Sault Ste Marie, Ontario
21,236	Mike McCafferty, Idaho Falls, ID
18,403	Chris Zepka, North Adams, MA
14,500	Wayne Dewitt, Blue Island, IL
5,802	Dawn Best, Grant, NE

BUZZARD BAIT *(Tom Mix)*

4,455,150	★Paul Rumrill, Gales Ferry, CT
3,091,700	Blossom Mayor, East Greenbush, NY
1,133,850	Rupert Young, Sheffield, MA
980,500	Fruber Malcom, Culpeper, VA
847,400	Gordon Rock, Davenport, IA
123,800	Michel LeBrun, Anjou, Quebec
107,100	Jesse Funston, Galena, IL
65,650	Cory Funston, Galena, IL

CALIXTO ISLAND *(Mark Data)*

207	★Philip Billoni & Tom Burgum, Lancaster, PA

CANYON CLIMBER *(Radio Shack)*

9,129,100	★Gary Mohnsen, Tucson, AZ
1,347,800	Lucy Dorego, Leamington, Ontario
1,004,000	Brett Fancher, Hooksett, NH
513,000	Rick Busse, Granite City, IL
449,000	Pat Leathrum, Newark, DE
297,200	Gordon Rock, Davenport, IA
129,600	Michel LeBrun, Anjou, Quebec
75,000	Anthony Perez, Westminster, CA

CASHMAN *(MichTron)*

$45,900	★Gordon Rock, Davenport, IA
31,260	Fred Naumann, Hailey, ID
30,050	Keith Miller, Houston, TX
27,530	Sally Naumann, Hailey, ID
24,920	Edwin Prather, Oxnard, CA
20,390	Craig Cornell, Greentown, IN
18,950	Trevor Fridfinnson, Arborg, Manitoba
15,730	Jon Sowle, Sanford, FL

CHOPPER ASSAULT (THE RAINBOW, 6/85)

1,446	★Jon Hobson, Plainfield, WI
252	Curtis Frazier Jr., Enterprise, AL

CHOPPER STRIKE *(MichTron)*

29,200	★Christopher Romance, Massapegua Park, NY

CLOWNS & BALLOONS *(Radio Shack)*

352,020	★Faye Keefer, Augusta, GA
60,690	Mary Largent, Madison, MS
45,460	Joyce Walcott, Mt. Clemens, MI
31,770	Cameron Walcott, Mt. Clemens, MI
30,190	Jason Smith, Ellijay, GA
26,230	Drew Gomillion, Jay, FL

COLOR BASEBALL *(Radio Shack)*

814-1	★Frank D'Amato, Brooklyn, NY
707-0	•Chislain Chillis, Trois-Rivieres, Quebec
549-0	•Skipper Taday, East Lyme, CT
256-4	Ellsworth Summers, Jacksonville, FL
243-0	•Steve Mutton, Shrewsbury, MA
96-0	•Mike Wochek, Bethel, CT

COLORPEDE *(Intracolor)*

3,107,194	★John Ray, Goodlettsville, TN
1,066,000	Keith Queen, Marietta, GA
1,006,000	Gail Queen, Marietta, GA
133,036	Mariano Frausto, Blue Island, IL
59,529	Kevin Radwan, Blue Island, IL

COLOR POKER (THE RAINBOW, 4/83)

2,756,000	★Earl La Jesse Foster, Lynchburg, VA

CRYSTLE CASTLES *(ThunderVision)*

850,156	★Michael Brennan, Calgary, Alberta
800,060	Dan Mitenko, Calgary, Alberta
689,751	Edwin Prather, Oxnard, CA
559,380	Jeff Dinger, Edgewood, MD
545,000	Jay Roberg, Winfield, KS
182,038	Jeff Heesacker, Salem, OR

CU*BER *(Tom Mix)*

179,525	★Trevor Fridfinnson, Arborg, Manitoba
26,755	Mitch Hart, Seattle, WA

DALLAS QUEST *(Radio Shack)*

87	★Douglas Bell, Duncan, OK
90	Roy Grant, Toledo, OH
91	John Semonin, Akron, OH
92	David & Shirley Johnson, Leicester, NC
93	Tommy McClure, Doyline, LA
93	Robert Sunderland, Sacramento, CA

DANGER RANGER *(Med Systems)*

3,905	★Kevin Cornell, Greentown, IN

DECATHALON *(Spectral Associates)*

9,232	★Ryan Charland, St. Laconia, NH

DEMOLITION DERBY *(Radio Shack)*

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97,600	Hillel Morris, Chicago, IL
93,500	Keith Tysinger, Asheboro, NC
88,800	Skipper Taday, East Lyme, CT
74,400	Daniel Bisbee, Chesterfield, MA
44,900	Oscar Rodriguez, Carolina, Puerto Rico
38,700	J. Michael Davidson, Cartersville, GA

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57,655	Tracy Salzman, LaSalle, CO
45,775	Mike Watson, Northville, NY
34,990	Skip Freamon, Citrus Heights, CA
32,190	Roger Dingledine, Chapel Hill, NC
29,515	Drew Gomillion, Jay, FL
27,260	Rupert Young, Sheffield, MA
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18,460	Scott Bellman, Bettendorf, IA
9,165	Steven Place, Webster, NY

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20,000	Lucy Dorego, Leamington, Ontario

DESERT RIDER *(Radio Shack)*

68,872	★Janine Freamon, Citrus Heights, CA
65,215	Skip Freamon, Citrus Heights, CA
51,519	Michael Lizardy, Oregon, OH
37,912	Kenneth Merkel, Houston, TX
37,550	Keith Miller, Houston, TX

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2,586,300	★Eugene Roosa, Stone Ridge, NY
1,618,400	Diane Guernon, Montreal, Quebec
450,600	Michael Brennan, Calgary, Alberta
8,970	Curtis Taylor, Scarborough, Ontario

DOWNLAND *(Radio Shack)*

68,142	★Cooper Valentin, Vavenby, British Columbia
45,291	Chuck Morey, Bakersfield, CA
38,014	James Pede, Rosedale, British Columbia
33,450	Mike Tindall, Manitowoc, WI

DRACONIAN *(Tom Mix)*

700,020	★Brian King, Orlando, FL
628,470	Jeff Coladonato, Roslyn, PA
203,190	Bryan Jenner, Calgary, Alberta

DRAGON FIRE *(Radio Shack)*

123,120	★Rupert Young, Sheffield, MA
12,498	Randy Jefferson, Makoti, ND
11,833	Mary Edwards, Imperial, MO
10,270	Brian Matherne, Gretna, LA
9,942	Andy Grant, Columbia, KY
9,864	John Guptill, Columbia, MO
8,459	Michael Posey, Stillwater, OK
8,166	Michael Etchason, Sauk Rapids, MN
7,212	Stevie Mode, Newton, NC
4,880	Tandy Carter Jr., Atwater, CA
4,880	Kristie Edwards, Imperial, MO
3,499	Chad West, Imperial, MO
3,120	Dwayne West, Imperial, MO
2,413	Rodney Mullineaux, Gig Harbor, WA
2,266	Steve Marko, Maumee, OH
2,010	Shane Bouley, Baltic, CT

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44,800	William Futer, Bridgeton, NJ

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276,900	★Jon Schmidt, Buffalo, MN
198,000	Pat Leathrum, Newark, DE
66,900	Michael Drouin, Reeds Spring, MO
47,300	Esther Cassell, Eastern Passage, Nova Scotia
16,500	Baiju Shah, Deep River, Ontario
15,650	Craig Cornell, Greentown, IN
ELEC*TRON *(Tom Mix)*	
45,890	★Byron Alford, Raytown, MO
40,650	Brad Gaucher, Hinton, Alberta
28,760	Craig Cornell, Greentown, IN
32,625	John Morris, Rustburg, VA
ENCHANTER *(Infocom)*	
80/115	★Scott Bellman, Bettendorf, IA
FALCON'S LAIR (THE RAINBOW, 8/85)	
18,461	★Joyce Smith, Butler, PA
17,463	Michael Scott, Johnstown, NY
15,707	Daniel Cecil, Bardstown, KY
14,627	Alexander Taday, East Lyme, CT
12,497	Dick Teeter, Hawley, PA
9,984	Roy Geeo, Hot Springs, AR
9,493	Pascal Ranchon, Richmond, Quebec
FIRESTORM (THE RAINBOW, 1/86)	
4,220	★Bobby Shotko, Easton, PA
2,080	Brook Whiffen, Jackson, MS
FOODWAR *(Arcade Animation)*	
270,360	★Edwin Prather, Oxnard, CA
261,905	Kevin Cornell, Greentown, IN
165,960	Chris Cope, Central, SC
FOOTBALL *(Radio Shack)*	
291-0	★●Brian Austin, New Salisbury, IN
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11,580	★Candi Granger, Marion, IN
11,080	Mark Ferris, Deep River, Ontario
FROGGIE *(Spectral Associates)*	
24,360	★Curtis Taylor, Scarborough, Ontario
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7,270	Christopher Taylor, Scarborough, Ontario
GALACTIC ATTACK *(Radio Shack)*	
54,300	★Cooper Valentin, Vavenby, British Columbia
33,930	Allisont Iarosis, Owego, NY
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19,410	Ron Volans, Ogdensburg, NY
GALAGON *(Spectral Associates)*	
1,306,640	★Jackie Maddox, Iron Station, NC
520,700	Keith Queen, Marietta, GA
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GHANA BWANA *(Radio Shack)*	
459,930	★Gene Wells, Silsbee, TX
325,900	Rupert Young, Sheffield, MA
253,960	James Ginn, Laurel, IN
248,540	Byron Alford, Raytown, NO
226,360	Kristopher Staller, Ft. Wayne, IN
225,180	Skip Freamon, Citrus Heights, CA
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102,540	★Greg Erickson, Lowell, MA
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55,120	Jeff Weeks, Wetaskawin, Alberta
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642,450	★Jesse Sanders, Chimney Rock, CO
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274,300	Andrew Reeves, Woodinville, WA
265,600	Eric Crichlow, Las Vegas, NV
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GONE FISHING (THE RAINBOW, 1/84)	
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GRAVITOR *(Prickly-Pear)*	
42,100	★Rodney Mullineaux, Gig Harbor, WA
HAYWIRE *(Mark Data)*	
1,600	★Curtis Frazier Jr., Enterprise, AL
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121,000	★Shane Bouley, Baltic, CT
85,225	Pierre-Antoine Levesque, Sainte-Foy, Quebec
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1,187,520	★Larry Thomson, Menominee, MI
7,320	Curtis Taylor, Scarborough, Ontario
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4,200	★Scott Bellman, Bettendorf, IA
KATERPILLAR ATTACK *(Tom Mix)*	
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4,092,600	★Fruber Malcom, Culpeper, VA
1,670,900	Yolanda Farr, Sayre, PA
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29,450	Mark Motel, Blue Island, IL
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KLENDATHU *(Radio Shack)*	
1,347,020	★Paul Shoemaker, Quartz Hill, CA
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149,190	★Daniel Lesage, Laval, Quebec
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112,235	Ted Glover, Kirkland, WA
110,250	Brian Austin, New Salisbury, IN
107,720	Rodney Mullineaux, Gig Harbor, WA
KRON *(Oregon Color Computers)*	
34,100	★Rene Ringuette, Riviere-du-Loup, Quebec
LASERWORM & FIREFLY (THE RAINBOW, 11/83)	
59,782	★Mark Bockelman, Napoleon, OH
38,380	Brian Voges, Jasper, IN
LUNAR-ROVER PATROL *(Spectral Associates)*	
511,100	★Michael Gray, Fraser Lake, British Columbia
249,510	Ken Pledge, 100 Mile House, British Columbia
136,700	Lori Day, Arlington, TX
MARATHON (THE RAINBOW, 10/83)	
310,000	★John Guptill, Columbia, MO
307,790	James Sheedy III, Tonawanda, NY
MARBLE MAZE *(Diecom Products)*	
36,354,780	★Melvin Sharp Jr., Baltimore, MD
106,950	Dan Bouges, Niantic, CT
103,560	Stephane Ouzilleau, Lauzon, Quebec
34,330	Brian Biggs, Galloway, OH
33,410	Brett Bias, Enterprise, AL
33,200	Scott Bellman, Bettendorf, IA
29,730	Tyson Mullineaux, Gig Harbor, WA
23,770	Rodney Mullineaux, Gig Harbor, WA
MAROONED! *(Saguaro)*	
34	★David Gunther, La Habra, CA
58	Mikel Rice, Panama City, FL
THE MARTIAN CRYPT *(NOVASOFT)*	
31	★John Allocca, Yonkers, NY
31	★Roy D. Grant, Toledo, OH
31	★Nolan Lee, Sun, LA
MEGA-BUG *(Radio Shack)*	
17,250	★Keith Queen, Marietta, GA
14,785	Blain Jamieson, Kingston, Ontario
14,241	Scott Swedis, Spencer, MA
13,863	Renita Mischler, Addison, IL
12,083	Gary Balkam Jr., Amherst, Nova Scotia
11,500	Jerry Queen, Marietta, GA
10,890	Craig Cornell, Greentown, IN
7,759	Dawn Best, Grant, NE
4,220	Cormac Quinn, New Hope, PA
MICROBES *(Radio Shack)*	
161,920	★John Guptill, Columbia, MO
MIDDLE KINGDOM *(Computerware)*	
11,048	★Mitch Hart, Seattle, WA
MONKEY KONG *(Med Systems)*	
622	★Krista Cassell, Eastern Passage, Nova Scotia
365	Mark Ferris, Deep River, Ontario
MONSTER MAZE *(Radio Shack)*	
206,780	★Wanda Jones, Brantford, Ontario
93,890	Rupert Young, Sheffield, MA
60,120	Steve Thomas, Ogdensburg, NY
43,610	Tim Cragg, Kahoka, MO
34,140	Cooper Valentin, Vavenby, British Columbia
MOON HOPPER *(Computerware)*	
376,350	★Rene Ringuette, Riviere-du-Loup, Quebec
102,940	Krista Cassell, Eastern Passage, Nova Scotia
100,410	Craig Cornell, Greentown, IN
80,470	Brett Bias, Enterprise, AL
80,050	Matt Yentes, Urbana, IN
MR. DIG *(Computerware)*	
6,787,000	★Jeff Roberg, Winfield, KS
3,533,650	Paula James, Lumberton, TX
2,261,900	Stephane Ouzilleau, Lauzon, Quebec
MS. GOBBLER *(Spectral Associates)*	
47,250	★Trevor Fridfinnson, Arborg, Manitoba
MUDPIES *(MichTron)*	
66,700	★Kevin Cornell, Greentown, IN
NINJA WARRIOR *(Programmer's Guild)*	
108,000	★Eric Gladstone, Ocala, FL
106,300	Spencer Reeves, Baton Rouge, LA
68,100	Larry Strome, Humboldt, Saskatchewan
60,300	Scott Enman, Belle Mead, NJ
53,200	Mike McCafferty, Idaho Falls, ID
49,000	Mike Buckley, Charlotte, NC
46,300	Mike Wochek, Bethel, CT
33,000	Jeff Carr, Dartmouth, Nova Scotia
26,700	Tyson Mullineaux, Gig Harbor, WA
ONE-ON-ONE *(Radio Shack)*	
910-58	★Michael Lizardy, Oregon, OH
880-411	Mitch Hart, Seattle, WA
434-52	Erik Huffman, Rochester Hills, MI
424-10	Brian Biggs, Galloway, OH
422-174	Brian Austin, New Salisbury, IN
226-98	Jonathan Beal, Addison, ME
86-2	David Craft, Roanoke, VA
OPERATION FREEDOM (THE RAINBOW, 8/85)	
73,529	★Kirby Smith, York, PA
23,347	Ed Westberg, Jensen Beach, FL
19,614	Mary Edwards, Imperial, MO
12,673	Alexander Taday, East Lyme, CT
12,275	Brian Hanna, London, KY
OUTHOUSE *(MichTron)*	
152,270	★Jon Sowle, Sanford, FL
PENGUIN (THE RAINBOW, 2/85)	
48,250	★Paul Wagorn, Carp, Ontario
44,550	Kevin Gallagher, Santa Monica, CA
20,780	George Bodiroga, Eureka, CA
8,470	Joseph Tokarz Sr., Blossburg, PA
1,660	Robert Nicosia, Gloversville, NY
PHANTOM SLAYER *(Med Systems)*	
166	★Tony Morandi, Santa Barbara, CA
PINBALL *(Radio Shack)*	
5,155,150	★Mark Nolte, St. Walburg, Saskatchewan
5,150,650	Andrew Bartels, Sulphur, OK
PITFALL II *(Activision)*	
110,832	★Erik Huffman, Rochester Hills, MI
75,000	Scott Enman, Belle Mead, NJ
PITSTOP II *(Epyx)*	
9	★Peter Vitali, Bridgeport, CT
PLANET INVASION *(Spectral Associates)*	
155,000	★Jimmy Doyle, Barrackville, WV
126,550	Thomas Mayor, Brooklyn, NY
67,700	Alan Drazen, Longwood, FL
58,650	Ghislain Chillis, Trois-Rivieres, Quebec
39,350	Paul Hotz, Herzlia, Israel
POLARIS *(Radio Shack)*	
189,867	★Andre Savoie, Marieville, Quebec
101,045	Darrel Behrmann, Napoleon, OH
29,472	Ron Volans, Ogdensburg, NY

POLTERGEIST *(Radio Shack)*
7,430 ★Myriam Ferland, Trois-Rivieres, Quebec
6,000 Billy Fairfull, Charleston, SC
4,840 Steve Thomas, Ogdensburg, NY
4,065 Joseph Tokarz Jr., Blossburg, PA
3,330 Brian Matherne, Gretna, LA
POOYAN *(Datasoft)*
3,785,000 ★Ben Collins, Clemson, SC
1,987,000 Jon Sowle, Sanford, FL
1,253,200 Thomas Mayor, Brooklyn, NY
266,300 Pat Leathrum, Newark, DE
250,050 Andrew Reeves, Bothel, WA
195,650 Donald Williams, Prince George, British Columbia
76,050 Michael Wolcheski, Meriden, CT
20,540 Craig Cornell, Greentown, IN
POPCORN *(Radio Shack)*
116,630 ★Keith Aschemeier, Napoleon, OH
67,270 Matt Heinemann, Richmond, VA
57,680 Melita Boudreault, Port-Cartier, Quebec
56,500 Bruce Johnson, Vavenby, British Columbia
50,210 Scott Swedis, Spencer, MA
35,440 Timothy Becksvoort, Holland, MI
30,850 Kevin Rompola, Traverse City, MI
29,260 Ian Hanson, Houston, TX
24,990 Kristal Nolen, Independence, MO
PROJECT NEBULA *(Radio Shack)*
3,815 ★Christopher Romance, Massapequa Park, NY
RACER (THE RAINBOW, 3/85)
301.9 ★Kirby Smith, York, PA
283.4 Jennifer Woland, Silverdale, PA
15.0 Craig Cornell, Greentown, IN
12.9 Robert Nicosia, Gloversville, NY
12.4 Michael Scott, Johnstown, NY
RADIO BALL *(Radio Shack)*
4,510,740 ★Les Dorn, Eau Claire, WI
1,330,500 Sara Grace, Baltimore, MD
1,301,350 Brian Matherne, Gretna, LA
1,060,250 Pat Mulhern, Newark, CA
REACTOIDS *(Radio Shack)*
9,041,285 ★James Eldred, Mill Hall, PA
9,350 Dawn Best, Grant, NE
RED-GREEN GAME (THE RAINBOW, 9/85)
4,681 ★Jon Hobson, Plainfield, WI
ROBOTTACK *(Intracolor)*
599,150 ★Douglas Hauk, Peoria, IL
547,800 Stephane Ouzilleau & Daniel Cloutier, Lauzon, Quebec
499,450 Mark Ferris & Adrian Osbourne, Deep River, Ontario
492,250 Bryan Jenner, Calgary, Alberta
478,350 Christopher Behler, Bethlehem, PA
469,300 Russell McCombs, Washington, PA
372,600 Dan Bouges, Niantic, CT
357,300 Brian Behler, Bethlehem, PA
347,250 Peter Kovach, Fridley, MN
ROMAN CHECKERS *(Radio Shack)*
63-1 ★Timothy Becksvoort, Holland, MI
ROMMEL 3-D *(MichTron)*
38,000 ★Rodney Mullineaux, Gig Harbor, WA
ROVER *(T & D Software)*
15,180 ★Michael Lizardy, Oregon, OH
RUN FOR YOUR LIFE (THE RAINBOW, 4/85)
80,000 ★Brian Jensen, Drayton Valley, Alberta
50,000 Karen Goddard, Oshawa, Ontario
20,000 David Craft, Roanoke, VA
20,000 Ryan Devlin, Louisville, KY
20,000 Brian Voges, Jasper, IN
SAILOR MAN *(Tom Mix)*
879,100 ★Alan Drazen, Longwood, FL
741,100 Bryan Jenner, Calgary, Alberta
587,600 Kevin Cornell, Greentown, IN
567,900 Jon Sowle, Sanford, FL
351,700 Bob Dewitt, Blue Island, IL
317,200 Aaron Snyder, Hazleton, PA
SCARFMAN *(Cornsoft)*
211,720 ★Mitch Hart, Seattle, WA
SHENANIGANS *(Mark Data)*
90 ★Roy Grant, Toledo, OH
95 Jeff Hillison, Blacksburg, VA
95 David Kay, Winnipeg, Manitoba
99 Ed Emelett, Nanticoke, PA
SHOCK TROOPER *(Mark Data)*
214,203 ★Fruber Malcom, Culpeper, VA
100,040 Rodney Mullineaux, Gig Harbor, WA
36,980 Tom Taulli, Monrovia, CA
28,453 Keith Miller, Houston, TX
SHOOTING GALLERY *(Radio Shack)*
227,840 ★Cliff Farmer, McGregor, TX
35,000 Bruce Johnson, Vavenby, British Columbia
18,500 Ken Dewitt, Blue Island, IL
SKIING *(Radio Shack)*
:59 ★Tim North, Emporia, KS
1:00 Scott Clevenger, Fairmount, IN
1:00 Billy Fairfull, Charleston, SC
1:10 Kevin Gallagher, Santa Monica, CA
1:13 Anthony Perez, Westminster, CA
SOLO POKER *(Datasoft)*
1,400 ★Frank D'Amato, Brooklyn, NY
SPACE AMBUSH *(Computerware)*
116,820 ★Shawn Corway, College Point, NY
29,480 Frank Canepa III, Santurce, Puerto Rico
SPACE ASSAULT *(Radio Shack)*
232,120 ★Jim Tucker, Commerce, TX
200,300 Scott Swedis, Spencer, MA
24,430 Michael Drouin, Reeds Spring, MO
19,065 Steven Allen, Sharpsburg, MD
18,310 Robin Volans, Ogdensburg, NY
SPACE WREK *(Spectral Associates)*
58,300 ★Brad Gaucher, Hinton, Alberta
48,500 Lawerence Schweitz, Calgary, Alberta
SPEED RACER *(MichTron)*
145,400 ★Brian King, Orlando, FL
142,310 Kevin Cornell, Greentown, IN
142,100 Chris Harrison, Brooks, KY
139,210 Alan Drazen, Longwood, FL
129,950 Jeff Dinger, Edgewood, MD
SPIDERCIDE *(Radio Shack)*
1,540 ★Mike Tindall, Manitowoc, WI
STAR BLAZE *(Radio Shack)*
8,400 ★John Guptill, Columbia, MO
8,100 Curtis Frazier Jr., Enterprise, AL
7,050 Andreas Thaler, Coaticook, Quebec
6,950 Scott Iachetta, Rochester, NY
STELLAR LIFE-LINE *(Radio Shack)*
37,550 ★Michelle Wyner, Bloomfield, MI
STRATEGY FOOTBALL (THE RAINBOW, 8/83)
119-10 ★Thomas Laubach, Jacksonville, FL
TEMPLE OF ROM *(Radio Shack)*
959,400 ★Sonya Hurst, Richmond, CA
938,800 Christopher Romance, Massapequa Park, NY
101,800 Brian Matherne, Gretna, LA
101,100 Mark Lemke, Neenah, WI
93,200 Shane Lord, Inglewood, CA
TIME BANDIT *(MichTron)*
1,025,210 ★Terry Moore, St. Catherines, Ontario
747,460 Steven Coladonato, Roslyn, PA
619,270 Kristopher Staller, Ft. Wayne, IN
215,810 Mark Olson, Whitecourt, Alberta
106,390 Sylvain Castonguay, Chicoutimi, Quebec
THE TOUCHSTONE *(Tom Mix)*
227,540 ★Kristopher Staller, Ft. Wayne, IN
TUBE FRENZY *(Aardvark)*
125,800 ★Shawn Corway, College Point, NY
TUT'S TOMB *(Mark Data)*
247,800 ★Jerry Austin, Baraboo, WI
225,160 Robert Wright, North Queensland, Australia
189,960 Nicole Pouliot Coors, Mobile, AL
189,940 Mike McCafferty, Idaho Falls, ID
121,740 Ed Martinson, Newton, NC
50,790 Craig Cornell, Greentown, IN
VARLOC *(Radio Shack)*
2,000 ★Erik Huffman, Rochester Hills, MI
VENTURER *(Aardvark)*
2,800 ★Baiju Shah, Deep River, Ontario
THE VORTEX FACTOR *(Mark Data)*
100 ★Chris Paul, Canton, OH
WACKY FOOD *(Arcade Animation)*
123,700 ★Tyson Mullineaux, Gig Harbor, WA
WHIRLEYBIRD RUN *(Spectral Associates)*
117,000 ★Jeff Ray, N. Charleston, SC
105,400 Sylvain Castonguay, Chicoutimi, Quebec
54,500 Jay Aust, Marlborough, CT
47,050 Michel LeBrun, Anjou, Quebec
43,850 Glen Bilodeau, Otterburn Park, Ontario
31,300 Yakini Banks, St. Albans, NY
22,300 Robert Anderson, Sandy Hook, Manitoba
WILDCATTING *(Radio Shack)*
296,410 ★John Morris, Rustburg, VA
ZAKSUND *(Elite)*
9,100 ★Brian Baggett, Maumee, OH
ZAXXON *(Datasoft)*
2,061,000 ★Byron Alford, Raytown, MO
1,300,500 Dan Brown, Pittsford, NY
253,400 Bob Dewitt, Blue Island, IL
159,500 Thomas Mayor, Brooklyn, NY
70,280 Joseph Tokarz Sr., Blossburg, PA
70,200 Yakini Banks, St. Albans, NY
66,700 Rene Ringuette, Riviere-du-Loup, Quebec
65,200 Tandy Carter Jr., Atwater, CA
62,300 Brian Baggett, Maumee, OH
42,500 David Anderson, Midlothian, VA
ZONX (THE RAINBOW, 10/85)
15,900 ★Phillip Johnson, Scottsville, VA
13,600 Michael Etchason, Sauk Rapids, MN
6,300 Jeffry Long, Butler, PA
5,500 Baiju Shah, Deep River, Ontario
ZORK I *(Infocom)*
125 ★Scott Bellman, Bettendorf, IA

— Debbie Hartley

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints and tips, we encourage you to share them by sending them to the Scoreboard, c/o THE RAINBOW.

FEEDBACK

Scoreboard:

In response to Jon Olson's letter (December 1985), here is some help with *Dallas Quest*. When you get to the trading post and bribe the monkey, you should proceed with the following moves: DROP ALL, GET KNAPSACK, GET MIRROR, DROP MIRROR IN KNAPSACK (do the same with the pouch, photo and the ring), DROP KNAPSACK, PULL CURTAIN, GET FLASHLIGHT, CLIMB LADDER, LIGHT FLASHLIGHT and DROP FLASHLIGHT.

Then, to get to the crossroads, you must: GO EAST, GO SOUTH, GET KNAP, CLIMB LADDER, GET FLASHLIGHT, GO WEST, UNLIGHT FLASHLIGHT (you will need it later), GET PHOTO and SHOW PHOTO.

Next, the Indians take you to the crossroads. (You might want to get the coconuts, and pick the road to the west — Feat of Courage — which can be solved.)

David Rodriguez
Columbus, OH

Scoreboard:

In response to Ric Miller's letter concerning *Syzygy* (December 1985), when you get the light saber, go to where Darth Vader is and type `PRESS SWITCH`. When Darth Vader appears in front of you, hit him at the end of his light saber, which is closest to him. Keep hitting him there and he soon flees.

Also, anyone with information on how to get out of the vault in *Syzygy* please write to the "Scoreboard."

Eric Bly
Taber, Alberta

Scoreboard:

In response to Gordon Rock's letter (January 1986) concerning *The Arconiax Assignment*, to kill the moth you need to buy the mothballs at the store. To do this, you need the money, which is down in the sewer, or drain hole. To reach the money you need the gum and the pine branch. The pine branch is behind the bureau. Type `MOVE BUREAU` and this will solve all your problems.

Also, if anyone has any tips on *Madness and the Minotaur*, especially how to get out of the maze, I need it. I'm always lost in the maze, trying to get the things that are needed, and my lamp goes out. If anyone has any information please write to the "Scoreboard."

Ed Westberg
Jensen Beach, FL

Scoreboard:

In response to Albert Kruegel and Ray Sutyla's letters (January 1986) concerning *Madness and the Minotaur*, to get the first spell, you need the basket and the mushroom. Take them to the Air of Enchantment on the first level. When you get Vetar (the first spell) it tells what you need for the next spell.

To use a spell, just type the name of it. Do not move if you lose your lamp — just type `VETAR` (if you have the spell) and the lamp returns automatically.

Finally, to map the maze get some half-inch graph paper. In a block, put a number for the first room. From that block put dashes to the ways you can leave the room. On a blank piece of paper, put the corresponding number and a description of the room.

I would like to know how to kill the wizard in *Dungeons of Daggorath* and how many levels there are in the game.

Donald Dare
Pittsfield, PA

Scoreboard:

In response to Tim McCarty's question [January 1986] about how to get past the Worm Master in the Adventure game *To Preserve Quandic*, I have a solution. You must go back to the Picture Room, which is right below the room with the eyes in it. Then you must go west to the room with the sign reading "You're Almost There." Next, go north and you will see a box. Type `SEARCH BOX` and get the "machine." After that, type `ENTER BOX`. Now try going to the Worm Master.

Ryan Smith
Placerville, CA

Scoreboard:

Concerning Fred Turner's question (January 1986), when you are in the Pyramid of *Calixto Island*, go through the crevice and go south, east, east and south. Make sure you have the mice from the shed to feed to the snake so you can get the paddles. To get out, go north, west, west and north.

J&P Via
Conestoga, PA

A WORD ABOUT ADVENTURES

Scoreboard:

Sands of Egypt, by Radio Shack, is well thought out and humorous, with excellent graphics. It has one glaring defect in the program, though. It counts loading the game as one move. Load the game and type `SCORE`. The screen says you have used one move. Save the game at that point and then reload that saved game. Now you have used two moves. As many times as you use the "Save-Load" sequence, that's how many moves you add to your final score. Very depressing when one is shooting for a low score in an Adventure game.

Another point about graphics Adventure games in general is that all the games I have played (Mark Data, Tom Mix, Computerware, etc.) display a congratulatory screen at the end of the game that tells your score. Unless you see that congratulatory screen, the game isn't over and you still have more Adventuring to do. In *Sands of Egypt*, for instance, I can get into the treasure room in 76 moves. That isn't the end of the game, though. It takes 89 moves to get the treasure back to civilization and complete the game. I would suggest that wherever possible, use the score displayed on that screen when submitting scores to the "Scoreboard."

Roy D. Grant
Toledo, OH

INSIGHT TO NEW SOFTWARE

Scoreboard:

I recently purchased *Zork I*, by Infocom, and I must say I am really impressed. I would highly recommend this game to "Adventure nuts." Here are some tips.

To get into the house, type `OPEN WINDOW` when you find the one that is "slightly ajar." To enter the Great Underground Empire, type `MOVE RUG` while in the living room. To return to the light of day, go to the studio and type `GO UP CHIMNEY`.

Karate, by Diecom, is indeed a challenging game. Always remember that you have quite a few attack options. Don't favor any techniques, since the opponents will catch on and turn them against you. One good strategy is to flip over the opponent and attack from behind. If you do this quick enough he will not have a chance to react. Also, let your opponent come to you sometimes; don't always charge him.

Enchanter, by Infocom, is a very exciting game. If the game says that you are becoming hungry, thirsty or tired, then listen! It is important and you must fulfill your need to eat, sleep or drink. If you search the dungeon carefully, you can find a secret passage that helps your game. And one more: make maps. This is infinitely helpful in all Adventures.

How do I inflate the raft and use it? Is there a way to kill the dreaded Thief?

Can I enter the temple in *Enchanter*?

Can anyone tell me how to get anywhere in *The Martian Crypt* or *Omniverse*?

If anyone can help me out, let me know through the "Scoreboard."

Scott Bellman
Bettendorf, IA

HITCHHIKING THROUGH THE GALAXY

Scoreboard:

I recently received Infocom's Adventure, the *Hitchhiker's Guide to the Galaxy*, and have a few comments and hints for the game. First of all, the loading instructions are wrong. To load it, type `DOS` and press ENTER, not `RUN"GAME"`. Also, to SCRIPT at 9,600 Baud, type `POKE 150,1` *before* loading. Other Baud rates can also be poked.

Here are a few hints for other new players. The only thing I know of that you need from Earth is the junk mail and towel. To stop the bulldozer, you must `BLOCK` it. Don't take the towel until you get past the bulldozer.

When you are in "dark," read the room description *every* time it is printed.

To get the Babel fish, you need four other items. When the upper-half-of-the-room cleaning robot takes the fish, carefully read what it says in the parentheses.

Does anyone know how to get past the screening door on the Heart of Gold?

Michael Fischer
Great River, NY

RADIATION TREATMENT

Scoreboard:

Here's a tip on the game *Shock Trooper*, by Mark Data Products. At the end of each level, before going into the decontamination chamber, hold the trigger down until you are just about to burn up from too much radiation. Then enter the chamber; by doing this, you get extra points.

If you are on the level with the spiders and there are too many of them, move off the screen and then back on they should disappear.

Fruber Malcom
Culpeper, VA

STICK IT TO THE KING

Scoreboard:

In *Hall of the King*, try to light the stick after you have been in the dumb waiter. The strong updraft dries the stick out. Use the stick to burn the fermenting grain. Then, put the stick in the torch holder. The rest is up to you!

In *Sands of Egypt*, after you have found the treasure, ride the camel past the Pyramid.

Chris Hutchinson
Florence, SC

BONUS IS BETTER THAN TREASURE

Scoreboard:

Here are some helpful hints for people desiring high scores on *Tut's Tomb* by Mark Data.

Do not wait around on any screen trying to get treasure — go for your bonus.

On Screen 8, head for the top right-hand corner first and wait until they jam themselves at the top left-hand corner.

On Screen 10, always wait patiently on both sides of this chamber and do not take the treasure first.

On Screen 6 (this is the big puzzle), just make it quick and hope for the best.

I hope these hints help.

Robert Wright
North Queensland, Australia

WANTED: REAL ACTION

Scoreboard:

After getting killed in *War of the Worlds*, by Triad Pictures Corp., for the 50th time, I would like to know how you get in the jeep and, if so, in which direction do you go? Also, how do you get out of the forest and into some real action? The furthest I can get is to the logging camp and past a few other minor obstacles.

Peter Thorpe III
Missouri City, TX

TECHNIQUE FOR ONE-ON-ONE

Scoreboard:

I have a helpful tip for those with *One-on-One* by Radio Shack. I have found a way to hold the computer virtually scoreless.

The first thing you must do is set the parameters and choose Pro, Computer vs. Larry Bird, Eight-Minute Quarters and Winner's Outs. When you get the ball at the top of the key, put the joystick in the upper left-hand corner and shoot the ball at the same time. Dr. J jumps up and tries to block your shot. Sometimes he succeeds, but most of the time you get the shot through.

As soon as you hit the floor, put the joystick in the upper right-hand corner to cut back in front of Dr. J. If you make it, that's two points; you get the ball back and you can do the same thing again. If you miss the first shot, simply rebound the ball and go in for a slam dunk. If you execute this move properly, Dr. J shouldn't score more than 10 or 20 points in an eight-minute quarter game.

I have also noted a couple of things about the game. First, I noticed that Larry Bird is a much better player than Dr. J. He makes more outside shots and close shots than Dr. J. The second thing is that your fatigue bar has no effect on the technique I explained above. You don't have to call a timeout because Dr. J always calls one first.

Also, pressing 'S' while playing the game shows the shadow of the ball. Pressing ENTER pauses the game until you hit ENTER again. The BREAK key aborts the game.

Brian Biggs
Galloway, OH

SUBSTANTIAL BONUS

Scoreboard:

Here are my suggestions for Tom Mix's *The King* rivet level. Go to the top beam on the left or right and get the rivet. Jump up as the fire nears the hole where the rivet was and you'll get a 100 to 900 point bonus.

Also, for *Dragon Slayer*, when entering a room for the first time, hit ENTER so you can see what you need in order to continue. Then, hit an arrow key to move again.

I hope this helps!

William Futer
Bridgeton, NJ

MAKE A RUN FOR IT

Scoreboard:

I have a couple of tips for those who own the game *Color Baseball* by Radio Shack. (They work best when you play against the computer.)

First, when you are pitching, throw the ball to the catcher before the batter gets on the plate. Then, move the catcher right next to the pitcher and throw the ball to him. Next, throw the ball back to the catcher fast, and that will be a strike.

The next tip works when you have a runner for your own team on third base. Wait until the batter gets to the batting plate, then make your third baseman steal home. The pitcher won't throw the ball to home until your runner is in. When he does throw to home, simply hit the ball.

I need help on *Sands of Egypt* and *Pyramid*. If anyone can help, just write to the "Scoreboard."

Andrew Last
Waterloo, Ontario

JUMPING THE PIT

Scoreboard:

While playing *Madness and the Minotaur*, I have found that I cannot get out of the maze. When I get to the room with the small pit in the corner, I type `JUMP PIT`. But, all it says is "JUMP WHAT?" I have tried dropping everything and also typing `JUMP SMALL PIT`, `JUMP OVER SMALL PIT`, etc., but nothing works. If you have any suggestions, please write to the "Scoreboard."

Dan Franzen
Westlake, OH

Editor's Note: Try this: When you get the response "JUMP WHAT?" just type `PIT`.

To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers," c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will immediately forward your letter to the original respondent and, just as importantly, we'll share your reply with all "Scoreboard" readers in an upcoming issue.

For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`.

— Debbie Hartley

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PROGRAMS REQUIRE 16K EXTENDED BASIC FOR TAPE, AND 32K DISK UNLESS OTHERWISE NOTED.

HALL OF THE KING

This program combines all the things you look for in a great two disk graphics adventure program. The Hi-Res graphics are superbly done. The text portion of the screen and the graphics change quickly as you move through the **HALL OF THE KING.** You can move freely from one portion of the adventure to another. Call up your inventory at any time. You can even save or load a game at ANY time. **HALL OF THE KING** will challenge even the most seasoned adventurer.

HALL OF THE KING requires 64K EB and one disk drive. This exciting two disk adventure comes packaged in a vinyl case **$39.95**

HALL OF THE KING II — THE INNER CHAMBER

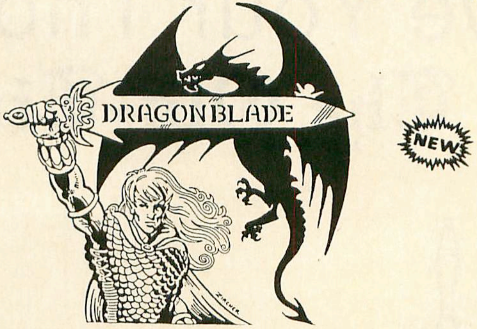
Continue your quest for the Earthstone in The Inner Chambers of the **HALL OF THE KING.** Outstanding graphics help show the way to success in your search to help restore the legendary power of the Earthstone to the dwarven race. The deeper you travel into the inner chambers, the more difficult your progress becomes. **HALL OF THE KING II** has all the fine feature of the first adventure. It is designed to follow the original **HALL OF THE KING** but may be played as a stand-alone adventure. The adventure fills two disks and comes packaged in a handsome vinyl folder. It requires one disk drive and 64K. **$39.95**

WARP FACTOR X

If you have been waiting for a game for your color computer that has everything, your wait is over. **WARP FACTOR X** is here. This all graphics simulation game requires strategy, fast thinking, an eye for detail, and above all experience in knowing the capabilities of your starship and its computer. (See review in Feb. 85 issue of Rainbow.) It requires 32K one disk drive and comes packaged in a vinyl library case. **$34.95**

DARKMOOR HOLD

You and your comrades will explore the levels of Darkmoor Hold in an effort to gain great riches and defeat the dark wizard. The Wizard will soon realize the threat you pose and the many monsters you meet and battle will become stronger and more powerful as you move through the 10 levels of Darkmoor. A keen eye will help you find weapons and armor to aid your battle along with treasures for you to keep. Your party consists of a Dwarf, an Elf, and you, the Human, each with their own special attributes. The weapons, armor and treasure are placed randomly in each level to provide a new challenge each time you play. You may also save the game you are playing since defeating the evil Wizard is not an easy task. It has great graphics and an impressive text screen to give you more fun than a barrel of elves. Requires 64KEB and 1 disk drive. **$29.95**



DRAGON BLADE
Animated Graphics Adventure

This 100% hi-res graphics adventure features many animated screens which will delight the avid adventurer. You search for the magic Blade which is the only way to rid your homeland of the fearsome dragon which has risen from a long rest to terrorize your village. Fill your screen with super graphics as your try to solve the difficult challenge the village leaders have set before you. Dragon Blade requries 64K Extended Basic and 1 disk drive. **$29.95**

UTILITIES

Microartist — Ver. 2.1 — see the review in the Dec. 85 issue of Rainbow. Req. 32k and joystick. **TAPE — $24.95 DISK — $29.95**

Disk Zapper — Ver. 1.8. The best. Edit and examine disks directly, use up to 40 tracks full copy utility allows easy transfer of files from disk to disk, format any number of tracks, and lots more. **$29.95**

Oracle II — The ultimate monitor. **$29.95**

RTD Trio — Take advantage of this special offer. This package of three utility programs includes our new DISK TO TAPE, TAPE TO DISK (version 2.0), and ROMFREE (version 2.0). TAPE TO DISK moves BASIC, ML and DATA files from tape to disk automatically — one program or an entire tape. It even fixes those programs that load at hex 600 so they work on a disk system. ROMFREE moves ROM packs to tape or disk easily, and fixes them so you just load and EXEC. ROMFREE now accomodates the larger 16K ROM packs. You won't believe how easy it is to protect your software library! These programs are shipped on tape. Requires 16K. **$49.95** (**$24.95** each if purchased separately)

Prickly Pear Maillist — Ver. 2.0 — You won't find a mailing list program anywhere that will out-perform this one. Req. 32K and one disk drive. Only **$29.95**

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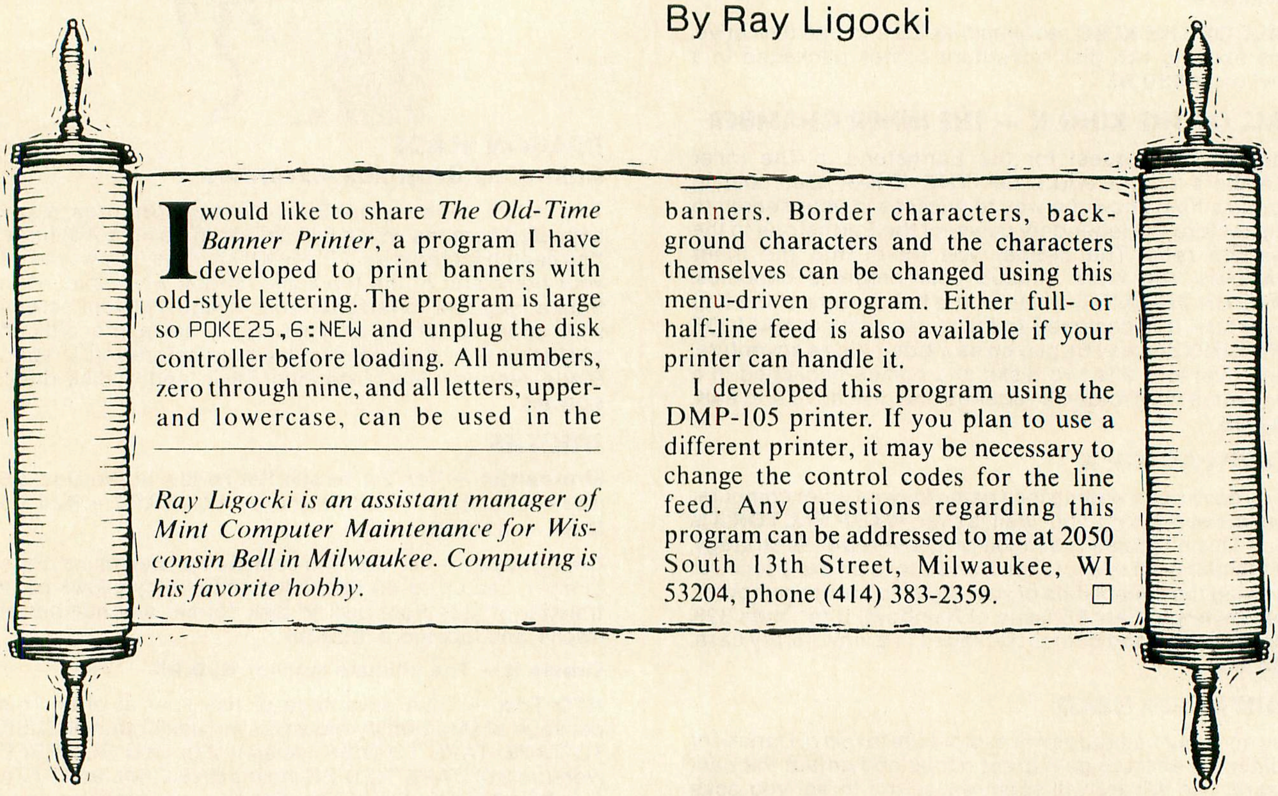
Give Your Thoughts to the World: The Old-Time Banner Printer

By Ray Ligocki



I would like to share *The Old-Time Banner Printer*, a program I have developed to print banners with old-style lettering. The program is large so `POKE25,6:NEW` and unplug the disk controller before loading. All numbers, zero through nine, and all letters, upper- and lowercase, can be used in the banners. Border characters, background characters and the characters themselves can be changed using this menu-driven program. Either full- or half-line feed is also available if your printer can handle it.

I developed this program using the DMP-105 printer. If you plan to use a different printer, it may be necessary to change the control codes for the line feed. Any questions regarding this program can be addressed to me at 2050 South 13th Street, Milwaukee, WI 53204, phone (414) 383-2359. ☐

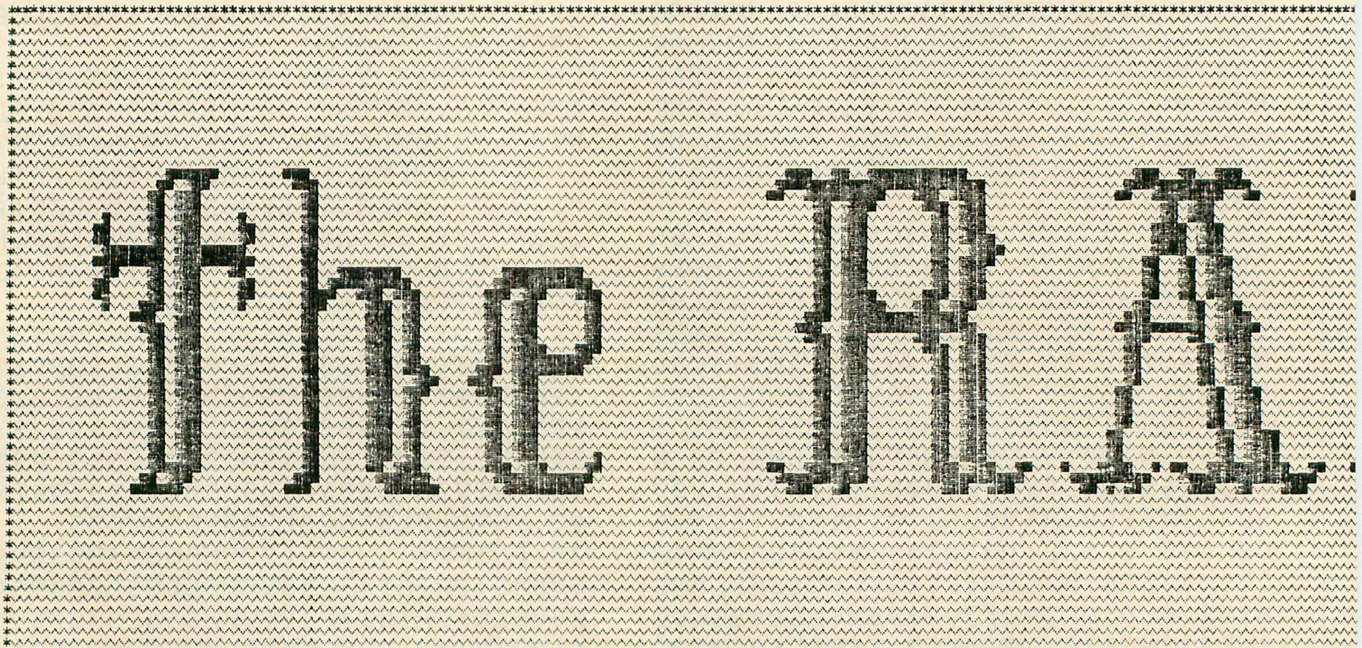
Ray Ligocki is an assistant manager of Mint Computer Maintenance for Wisconsin Bell in Milwaukee. Computing is his favorite hobby.

The listing: BANNER

```
0 CLS:CLEAR800:GOTO2000
1 Z=Z+1:VV$=MID$(AA$,Z,1):L=ASC(
VV$)
2 IFL=123THEN2034ELSEIFL=32THEN1
61
3 IFL>31ANDL<48THEN1ELSEIFL>57AN
DL<65THEN1ELSEIFL>90ANDL<97THEN1
ELSEIFL>124THEN1
4 IFCH=1THENA$=CHR$(L):GOSUB2032
:GOTO5ELSEGOSUB2032
5 IFL>47ANDL<58THENL=L-47:GOTO8
6 IFL>64ANDL<91THENL=L-54:GOTO8
7 IFL>96ANDL<123THENL=L-60:GOTO8
8 ON L GOTO9,11,13,16,19,22,26,2
9,32,34,37,41,43,45,47,49,51,54,
56,57,60,63,65,70,9,74,76,80,83,
86,88,92,94,97,101,105,109,111,1
12,113,114,115,117,119,121,123,1
25,128,130,132,133,134,136,138,1
40,143,146,148,150,153,156,158
9 GOSUB1000:GOSUB1002:GOSUB1004:
GOSUB1006:GOSUB1008:GOSUB1010:GO
SUB1012:GOSUB1014:GOSUB1016:GOSU
B1018:FORX=1TO5:GOSUB1020:NEXT
10 GOSUB1018:GOSUB1016:GOSUB1014
:GOSUB1012:GOSUB1010:GOSUB1008:G
OSUB1006:GOSUB1004:GOSUB1002:GOS
UB1000:FORX=1TO3:GOSUB998:NEXT:G
OTO1
11 PRINT#J,Y$V$M$A$W$U$S$Z$:PRIN
T#J,Y$V$L$B$W$U$S$Z$:PRINT#J,Y$V
$B$U$U$M$A$P$V$Z$:PRINT#J,Y$V$B$
U$N$A$S$B$O$V$Z$:PRINT#J,Y$V$C$U
$L$C$R$D$M$V$Z$:PRINT#J,Y$V$L$I$
```

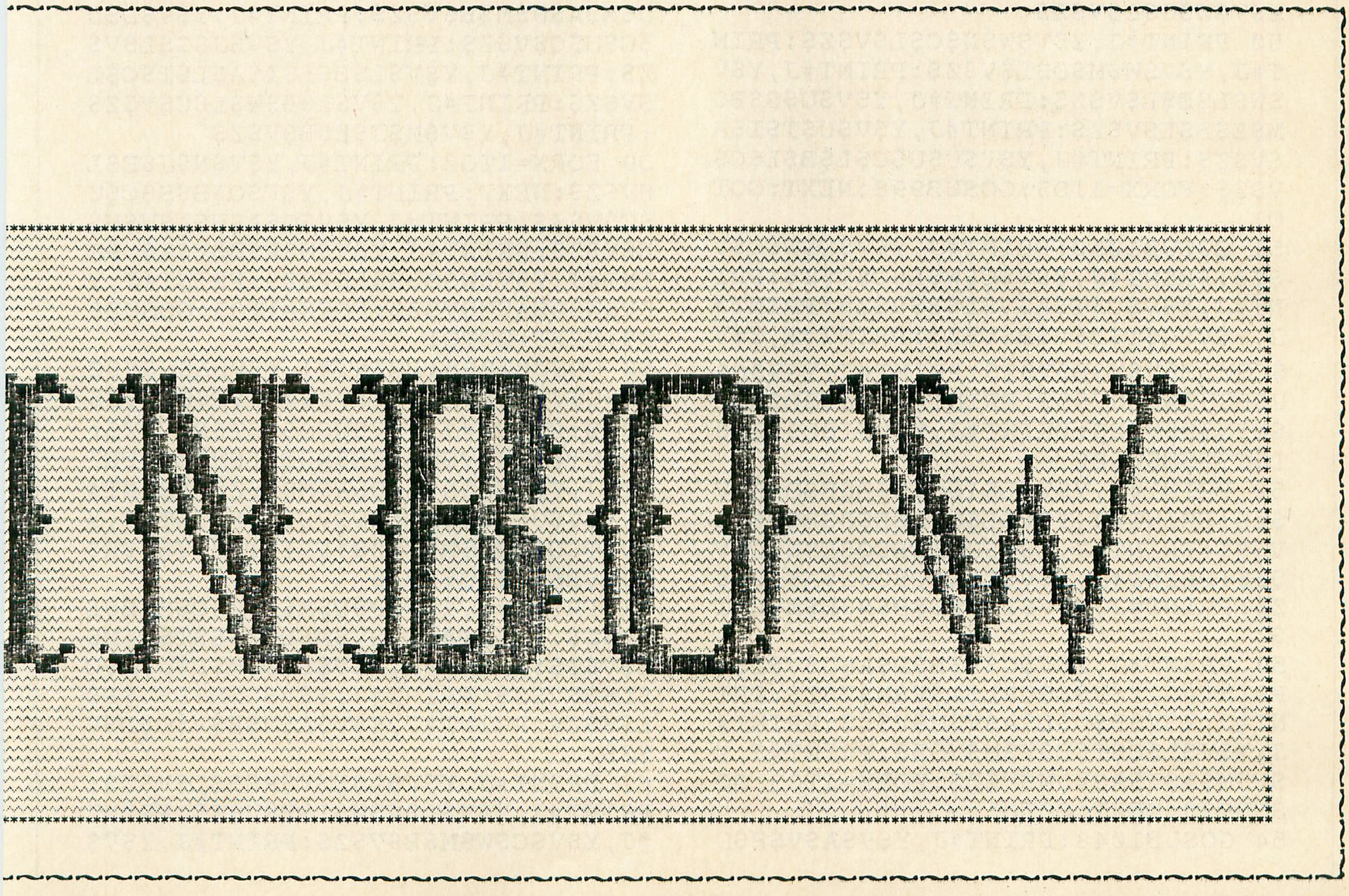
```
D$L$I$D$V$Z$:PRINT#J,Y$V$C$W$L$C
$V$Z$:FORX=1TO2:GOSUB1022:NEXT
12 PRINT#J,Y$V$C$U$L$C$U$N$V$Z$:
PRINT#J,Y$V$B$U$N$A$V$V$Z$:PRINT
#J,Y$V$B$W$P$V$Z$:PRINT#J,Y$V$L$
B$W$U$S$Z$:PRINT#J,Y$V$M$A$W$U$S
$Z$:FORX=1TO3:GOSUB998:NEXT:GOTO
1
13 PRINT#J,Y$V$D$W$N$V$Z$:PRINT#
J,Y$V$F$U$Q$B$L$A$L$B$L$V$Z$:PRI
NT#J,Y$V$C$M$D$U$M$H$V$Z$:PRINT#
J,Y$V$B$L$B$M$D$T$H$L$V$Z$:PRINT
#J,Y$V$F$A$M$C$R$A$N$E$M$V$Z$:PR
INT#J,Y$V$H$M$B$U$L$D$M$V$Z$:PRI
NT#J,Y$V$I$A$L$B$U$L$C$M$V$Z$
14 PRINT#J,Y$V$D$P$D$L$B$U$C$L$V
$Z$:PRINT#J,Y$V$C$S$C$L$C$T$B$L$
V$Z$:PRINT#J,Y$V$C$T$F$T$C$V$Z$:
PRINT#J,Y$V$C$U$E$T$C$V$Z$:PRINT
#J,Y$V$C$U$L$B$L$B$S$C$V$Z$:PRIN
T#J,Y$V$L$B$U$L$C$L$B$R$C$V$Z$:P
RINT#J,Y$V$L$C$U$D$L$C$P$C$V$Z$
15 PRINT#J,Y$V$L$E$P$A$P$C$M$G$V
$Z$:PRINT#J,Y$V$L$I$R$D$M$E$L$V$
Z$:PRINT#J,Y$V$L$H$T$H$M$V$Z$:PR
INT#J,Y$V$C$L$B$L$B$U$N$D$O$V$Z$
:FORX=1TO3:GOSUB998:NEXT:GOTO1
16 PRINT#J,Y$V$M$A$L$B$L$B$U$N$B
$L$A$L$B$L$V$Z$:PRINT#J,Y$V$L$H$
U$L$H$V$Z$:PRINT#J,Y$V$I$A$T$H$L
$V$Z$:PRINT#J,Y$V$L$G$M$A$R$A$N$
E$M$V$Z$:PRINT#J,Y$V$M$F$U$Q$D$M
$V$Z$:PRINT#J,Y$V$M$E$U$S$C$M$V$
Z$:PRINT#J,Y$V$M$D$U$U$B$M$V$Z$:
PRINT#J,Y$V$M$D$U$U$C$L$V$Z$
17 PRINT#J,Y$V$M$C$V$S$B$L$V$Z$:
PRINT#J,Y$V$M$C$S$C$L$A$L$C$P$C$
V$Z$:PRINT#J,Y$V$L$D$R$I$A$O$C$V
$Z$:PRINT#J,Y$V$L$D$Q$A$N$D$O$A$
N$C$V$Z$:PRINT#J,Y$V$L$D$U$L$B$T
$C$V$Z$:PRINT#J,Y$V$L$D$T$B$L$B$
S$C$V$Z$:PRINT#J,Y$V$E$S$B$L$A$L
$B$Q$D$V$Z$
18 PRINT#J,Y$V$F$P$C$L$C$L$G$L$B
$V$Z$:PRINT#J,Y$V$C$L$H$L$E$L$F$
L$C$V$Z$:PRINT#J,Y$V$D$L$F$A$L$F
$A$Q$D$V$Z$:PRINT#J,Y$V$L$D$R$D$
M$I$A$L$V$Z$:PRINT#J,Y$V$M$I$C$O
$H$M$V$Z$:PRINT#J,Y$V$O$H$V$N$V$
Z$:FORX=1TO3:GOSUB998:NEXT:GOTO1
19 PRINT#J,Y$V$S$B$U$U$V$Z$:PRIN
T#J,Y$V$S$D$V$O$V$Z$:PRINT#J,Y$V
$S$B$M$B$V$M$V$Z$:PRINT#J,Y$V$S$
D$M$B$V$V$Z$:PRINT#J,Y$V$S$F$M$B
$U$M$V$Z$:PRINT#J,Y$V$S$B$M$D$M$
B$U$V$Z$:PRINT#J,Y$V$M$A$P$B$O$D
$M$B$S$V$Z$:PRINT#J,Y$V$L$B$P$B$
Q$D$M$B$Q$V$Z$
20 PRINT#J,Y$V$B$Q$B$S$D$M$B$O$V
$Z$:PRINT#J,Y$V$B$Q$B$P$A$O$D$M$
B$M$V$Z$:PRINT#J,Y$V$C$P$B$O$C$P
$D$M$B$V$Z$:GOSUB1022:PRINT#J,Y$
V$L$I$D$L$I$D$V$Z$:PRINT#J,Y$V$C
$V$U$C$V$Z$:GOSUB1014:GOSUB1022:
GOSUB1022
21 PRINT#J,Y$V$C$R$O$C$U$N$V$Z$:
PRINT#J,Y$V$B$R$Q$A$V$V$Z$:PRINT
#J,Y$V$B$W$P$V$Z$:PRINT#J,Y$V$L$
B$W$O$V$Z$:PRINT#J,Y$V$M$A$W$O$V
$Z$:FORX=1TO3:GOSUB998:NEXT:GOTO
1
22 PRINT#J,Y$V$L$C$W$N$V$Z$:PRIN
T#J,Y$V$F$W$L$V$Z$:PRINT#J,Y$V$M
$E$T$B$Q$Q$V$Z$:PRINT#J,Y$V$M$F$
A$R$C$U$L$V$Z$:PRINT#J,Y$V$M$G$Q
$F$S$V$Z$:PRINT#J,Y$V$L$H$Q$B$M$
D$Q$V$Z$:PRINT#J,Y$V$I$B$O$D$M$D
$O$V$Z$:PRINT#J,Y$V$E$O$D$N$F$M$
D$M$V$Z$
23 PRINT#J,Y$V$D$R$B$N$G$M$D$V$Z
$:PRINT#J,Y$V$D$S$A$N$C$L$F$L$C$
V$Z$:PRINT#J,Y$V$D$U$N$B$M$H$V$Z
$:PRINT#J,Y$V$D$U$N$C$N$E$B$V$Z$
:PRINT#J,Y$V$D$U$N$C$P$E$V$Z$:PR
INT#J,Y$V$D$U$N$C$R$C$V$Z$:PRINT
#J,Y$V$B$L$A$Q$A$P$C$S$C$V$Z$
24 PRINT#J,Y$V$B$L$B$O$C$N$D$S$C
$V$Z$:PRINT#J,Y$V$C$L$I$B$L$C$R$
C$V$Z$:PRINT#J,Y$V$L$C$L$E$L$D$L
$C$S$C$V$Z$:PRINT#J,Y$V$M$C$U$D$
S$C$V$Z$:PRINT#J,Y$V$N$I$E$T$C$V
$Z$:PRINT#J,Y$V$O$I$C$U$C$V$Z$
25 PRINT#J,Y$V$P$I$A$U$L$C$V$Z$:
PRINT#J,Y$V$T$C$U$S$V$Z$:PRINT#J
,Y$V$U$A$U$T$V$Z$:FORX=1TO3:GOSU
B998:NEXT:GOTO1
26 PRINT#J,Y$V$P$G$S$Q$A$M$V$Z$:
PRINT#J,Y$V$N$I$D$U$B$L$V$Z$:PRI
NT#J,Y$V$M$C$T$E$T$B$V$Z$:PRINT#
J,Y$V$L$B$M$H$N$D$R$B$V$Z$:PRINT
#J,Y$V$L$A$M$I$B$N$D$P$B$V$Z$:PR
INT#J,Y$V$I$H$M$D$M$C$V$Z$:PRINT
#J,Y$V$E$U$F$M$F$L$V$Z$:PRINT#J,
Y$V$C$U$N$F$A$M$D$L$V$Z$
27 PRINT#J,Y$V$B$U$O$H$M$C$V$Z$:
PRINT#J,Y$V$B$U$O$C$M$F$L$B$V$Z$
:PRINT#J,Y$V$B$U$O$D$N$F$L$V$Z$:
PRINT#J,Y$V$B$U$O$D$P$D$L$V$Z$:P
RINT#J,Y$V$C$U$N$D$R$C$V$Z$:PRIN
T#J,Y$V$E$U$B$L$B$S$B$V$Z$:PRINT
#J,Y$V$B$L$I$C$L$B$T$B$V$Z$
28 PRINT#J,Y$V$L$B$M$G$M$D$S$B$L
$V$Z$:PRINT#J,Y$V$L$D$U$L$B$T$A$
M$V$Z$:PRINT#J,Y$V$M$I$E$S$P$V$Z
$:PRINT#J,Y$V$N$G$E$V$V$Z$:PRINT
#J,Y$V$O$H$B$V$L$V$Z$:FORX=1TO3:
```

```
GOSUB998:NEXT:GOTO1
29 PRINT#J,Y$V$W$L$A$P$V$Z$:PRIN
T#J,Y$V$M$A$U$U$C$O$V$Z$:PRINT#J
,Y$V$L$B$U$R$I$V$Z$:PRINT#J,Y$V$
L$B$U$R$D$L$E$V$Z$:PRINT#J,Y$V$B
$U$S$B$P$C$V$Z$:PRINT#J,Y$V$C$R$
U$I$V$Z$:PRINT#J,Y$V$L$C$Q$U$I$V
$Z$:PRINT#J,Y$V$L$E$V$I$V$Z$:PRI
NT#J,Y$V$H$V$O$C$V$Z$
30 PRINT#J,Y$V$C$N$F$U$P$C$V$Z$:
PRINT#J,Y$V$L$E$N$F$U$M$C$V$Z$:P
RINT#J,Y$V$L$G$N$F$T$C$V$Z$:PRIN
T#J,Y$V$C$L$G$N$F$Q$C$V$Z$:PRINT
#J,Y$V$B$P$G$N$F$N$C$V$Z$:PRINT#
J,Y$V$L$B$R$G$N$H$V$Z$:PRINT#J,Y
$V$M$A$U$G$N$F$V$Z$
31 PRINT#J,Y$V$V$M$G$N$C$V$Z$:PR
INT#J,Y$V$U$S$I$B$V$Z$:PRINT#J,Y
$V$V$R$H$V$Z$:PRINT#J,Y$V$W$L$F$
V$Z$:FORX=1TO3:GOSUB998:NEXT:GOT
O1
32 GOSUB1024:GOSUB1026:GOSUB1028
:GOSUB1030:GOSUB1032:GOSUB1034:G
OSUB1036:GOSUB1038:FORX=1TO4:GOS
UB1040:NEXT
33 GOSUB1038:GOSUB1036:GOSUB1034
:GOSUB1032:GOSUB1030:GOSUB1028:G
OSUB1026:GOSUB1024:FORX=1TO3:GOS
UB998:NEXT:GOTO1
34 PRINT#J,Y$V$U$R$G$P$V$Z$:PRIN
T#J,Y$V$U$P$I$B$N$V$Z$:PRINT#J,Y
$V$V$B$T$C$M$V$Z$:PRINT#J,Y$V$M$
A$U$B$L$I$L$B$L$V$Z$:PRINT#J,Y$V
$L$B$U$A$L$I$B$L$A$L$V$Z$:PRINT#
J,Y$V$B$U$I$G$V$Z$:PRINT#J,Y$V$B
$U$D$T$E$V$Z$:PRINT#J,Y$V$C$T$C$
U$M$C$V$Z$
35 PRINT#J,Y$V$L$D$R$B$V$B$V$Z$:
PRINT#J,Y$V$L$F$P$B$V$B$V$Z$:PRI
NT#J,Y$V$B$N$D$N$B$V$B$V$Z$:PRIN
T#J,Y$V$E$M$D$M$A$V$B$V$Z$:PRINT
#J,Y$V$L$F$M$F$U$M$C$V$Z$:PRINT#
J,Y$V$L$G$M$E$T$E$V$Z$:PRINT#J,Y
$V$C$M$F$M$I$D$L$B$V$Z$:PRINT#J,
Y$V$B$P$F$N$H$M$B$L$V$Z$
36 PRINT#J,Y$V$B$R$E$B$T$D$L$V$Z
$:PRINT#J,Y$V$L$B$S$H$G$M$V$Z$:P
RINT#J,Y$V$M$A$U$H$D$O$V$Z$:PRIN
T#J,Y$V$U$Q$G$Q$V$Z$:FORX=1TO3:G
OSUB998:NEXT:GOTO1
37 PRINT#J,Y$V$M$A$W$O$V$Z$:PRIN
T#J,Y$V$L$A$W$P$V$Z$:PRINT#J,Y$V
$B$W$P$V$Z$:PRINT#J,Y$V$B$W$P$V$
Z$:PRINT#J,Y$V$L$B$W$O$V$Z$:PRIN
```



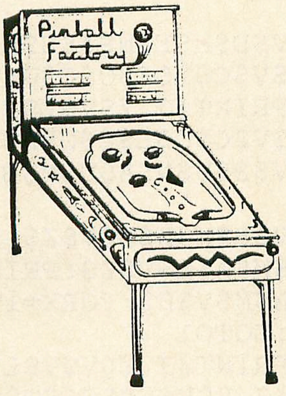
Original size: 25⅜" x 6"

```
T#J,Y$V$F$W$L$V$Z$:PRINT#J,Y$V$L
$H$P$A$R$O$A$M$V$Z$:PRINT#J,Y$V$
C$N$I$A$U$B$L$V$Z$:PRINT#J,Y$V$B
$S$G$U$B$V$Z$
38 PRINT#J,Y$V$L$A$Q$Q$G$Q$B$V$Z
$:PRINT#J,Y$V$M$A$Q$Q$A$M$E$B$M$
C$V$Z$:PRINT#J,Y$V$U$P$A$Q$E$B$L
$V$Z$:PRINT#J,Y$V$M$A$U$M$A$Q$E$
B$L$V$Z$:PRINT#J,Y$V$L$B$U$M$A$M
$E$B$M$C$V$Z$:PRINT#J,Y$V$B$U$M$
G$N$E$V$Z$:PRINT#J,Y$V$B$S$G$O$E
$B$L$V$Z$
39 PRINT#J,Y$V$C$N$G$O$E$F$L$V$Z
$:PRINT#J,Y$V$L$H$O$H$B$M$C$V$Z$
:PRINT#J,Y$V$L$E$O$I$B$Q$B$V$Z$:
PRINT#J,Y$V$C$N$I$B$U$B$V$Z$:PRI
NT#J,Y$V$H$G$U$B$L$V$Z$:PRINT#J,
Y$V$L$H$P$A$U$L$A$M$V$Z$:PRINT#J
,Y$V$L$E$W$L$V$Z$
40 PRINT#J,Y$V$L$E$W$L$V$Z$:PRIN
T#J,Y$V$C$W$O$V$Z$:PRINT#J,Y$V$B
$W$P$V$Z$:PRINT#J,Y$V$B$W$P$V$Z$
:PRINT#J,Y$V$L$B$W$O$V$Z$:PRINT#
J,Y$V$M$A$W$O$V$Z$:FORX=1TO3:GOS
UB998:NEXT:GOTO1
41 GOSUB1048:PRINT#J,Y$V$D$U$L$B
$T$D$V$Z$:FORX=1TO3:GOSUB1046:NE
XT:PRINT#J,Y$V$D$U$D$S$D$V$Z$:GO
SUB1014:PRINT#J,Y$V$B$L$I$A$L$B$
L$H$L$B$V$Z$:PRINT#J,Y$V$C$U$L$D
$T$C$V$Z$:PRINT#J,Y$V$E$B$L$I$D$
L$E$B$V$Z$:PRINT#J,Y$V$I$E$L$I$D
$V$Z$
42 PRINT#J,Y$V$I$E$L$I$D$V$Z$:PR
INT#J,Y$V$L$I$C$N$I$B$L$V$Z$:PRI
NT#J,Y$V$M$G$C$P$I$M$V$Z$:PRINT#
J,Y$V$Q$C$U$M$C$Q$V$Z$:PRINT#J,Y
$V$R$A$U$O$A$R$V$Z$:FORX=1TO3:GO
SUB998:NEXT:GOTO1
43 GOSUB1050:PRINT#J,Y$V$E$U$U$L
$D$V$Z$:PRINT#J,Y$V$D$W$C$V$Z$:P
RINT#J,Y$V$C$W$L$C$V$Z$:FORX=1TO
5:GOSUB1044:NEXT:PRINT#J,Y$V$C$U
$M$B$L$C$R$B$V$Z$:PRINT#J,Y$V$D$
U$L$E$B$Q$B$V$Z$:PRINT#J,Y$V$L$C
$U$M$D$S$B$V$Z$:PRINT#J,Y$V$L$D$
U$F$Q$B$L$V$Z$
44 PRINT#J,Y$V$M$D$T$E$B$O$C$L$V
$Z$:PRINT#J,Y$V$N$D$S$B$M$H$M$V$
Z$:PRINT#J,Y$V$V$M$A$O$F$N$V$Z$:
FORX=1TO3:GOSUB998:NEXT:GOTO1
45 GOSUB1048:PRINT#J,Y$V$C$U$L$C
$T$D$V$Z$:PRINT#J,Y$V$B$U$N$A$U$
L$C$V$Z$:GOSUB1042:GOSUB1042:PRI
```



```
NT#J,Y$V$C$W$D$V$Z$:GOSUB1014:PR
INT#J,Y$V$B$L$J$C$L$B$V$Z$:PRINT
#J,Y$V$C$W$L$C$V$Z$:PRINT#J,Y$V$
L$I$D$L$I$C$L$V$Z$:GOSUB1012
46 PRINT#J,Y$V$M$J$E$M$V$Z$:PRIN
T#J,Y$V$N$J$C$N$V$Z$:PRINT#J,Y$V
$Q$I$G$Q$V$Z$:GOSUB1002:GOSUB100
0:FORX=1TO3:GOSUB998:NEXT:GOTO1
47 GOSUB1048:PRINT#J,Y$V$D$U$L$B
$T$D$V$Z$:GOSUB1046:GOSUB1046:PR
INT#J,Y$V$C$S$A$M$C$M$A$R$C$V$Z$
:PRINT#J,Y$V$C$S$H$R$C$V$Z$:PRIN
T#J,Y$V$C$T$B$L$A$L$B$S$C$V$Z$:F
ORX=1TO2:PRINT#J,Y$V$C$W$L$C$V$Z
$:NEXT
48 PRINT#J,Y$V$L$C$V$S$C$L$V$Z$:
PRINT#J,Y$V$L$D$U$U$D$L$V$Z$:PRI
NT#J,Y$V$L$E$V$O$E$L$V$Z$:PRINT#
J,Y$V$L$E$B$M$B$Q$B$M$B$E$L$V$Z$
:PRINT#J,Y$V$I$A$S$I$A$V$Z$:PRIN
T#J,Y$V$C$L$B$L$C$U$C$L$B$L$C$V$
Z$:FORX=1TO3:GOSUB998:NEXT:GOTO1
49 GOSUB1048:PRINT#J,Y$V$C$U$M$B
$T$D$V$Z$:FORX=1TO2:PRINT#J,Y$V$
B$U$N$B$U$C$V$Z$:NEXT:PRINT#J,Y$
V$L$B$U$M$B$U$C$V$Z$:PRINT#J,Y$V
$M$A$S$A$M$C$M$A$R$C$V$Z$:PRINT#
J,Y$V$U$L$H$R$C$V$Z$:PRINT#J,Y$V
$U$M$B$L$A$L$B$S$C$V$Z$:PRINT#J,
Y$V$W$O$C$V$Z$
50 PRINT#J,Y$V$W$N$C$L$V$Z$:PRIN
T#J,Y$V$W$M$D$L$V$Z$:PRINT#J,Y$V
$W$L$E$L$V$Z$:PRINT#J,Y$V$U$S$B$
M$E$B$L$V$Z$:PRINT#J,Y$V$U$T$I$A
$V$Z$:PRINT#J,Y$V$U$U$C$L$B$L$C$
V$Z$:FORX=1TO3:GOSUB998:NEXT:GOT
O1
51 GOSUB1050:PRINT#J,Y$V$D$W$C$V
$Z$:PRINT#J,Y$V$C$W$L$C$V$Z$:PRI
NT#J,Y$V$C$T$A$V$L$B$V$Z$:PRINT#
J,Y$V$C$T$B$V$B$V$Z$:PRINT#J,Y$V
$C$U$B$U$N$B$V$Z$:PRINT#J,Y$V$C$
U$B$U$N$B$V$Z$:PRINT#J,Y$V$D$S$C
$U$N$B$V$Z$:PRINT#J,Y$V$I$D$N$B$
L$C$P$B$V$Z$
52 PRINT#J,Y$V$L$I$C$N$B$E$O$B$V
$Z$:PRINT#J,Y$V$L$C$S$B$O$D$P$C$
V$Z$:PRINT#J,Y$V$M$I$B$O$E$N$D$V
$Z$:PRINT#J,Y$V$L$I$C$O$I$A$L$V$
Z$:PRINT#J,Y$V$I$D$O$B$N$E$M$V$Z
$
53 PRINT#J,Y$V$C$T$B$P$A$U$V$Z$:
PRINT#J,Y$V$B$U$L$A$V$M$V$Z$:PRI
NT#J,Y$V$B$U$L$A$V$M$V$Z$:PRINT#
J,Y$V$L$B$T$B$V$M$V$Z$:PRINT#J,Y
$V$M$A$T$A$V$N$V$Z$:FORX=1TO3:GO
SUB998:NEXT:GOTO1
54 GOSUB1048:PRINT#J,Y$V$A$V$B$U
$M$A$V$Z$:FORX=1TO3:PRINT#J,Y$V$
V$L$B$U$N$V$Z$:NEXT:PRINT#J,Y$V$
A$V$B$U$M$A$V$Z$:GOSUB1012:GOSUB
1012:PRINT#J,Y$V$C$W$L$C$V$Z$:PR
INT#J,Y$V$I$E$L$I$D$V$Z$:GOSUB10
12:GOSUB1012
55 PRINT#J,Y$V$C$U$L$C$U$L$B$V$Z
$:PRINT#J,Y$V$B$U$N$A$U$M$B$V$Z$
:PRINT#J,Y$V$B$W$N$B$V$Z$:PRINT#
J,Y$V$L$B$W$M$A$L$V$Z$:PRINT#J,Y
$V$M$A$W$L$A$M$V$Z$:FORX=1TO3:GO
SUB998:NEXT:GOTO1
56 GOSUB1048:PRINT#J,Y$V$C$U$L$C
$U$C$V$Z$:PRINT#J,Y$V$B$U$N$A$U$
M$B$V$Z$:PRINT#J,Y$V$B$W$N$B$V$Z
$:PRINT#J,Y$V$L$B$W$L$B$L$V$Z$:P
RINT#J,Y$V$M$A$W$L$A$M$V$Z$:FORX
=1TO3:GOSUB998:NEXT:GOTO1
57 PRINT#J,Y$V$N$F$N$A$U$R$V$Z$:
PRINT#J,Y$V$M$G$M$B$U$Q$V$Z$:PRI
NT#J,Y$V$L$C$N$E$B$U$Q$V$Z$:PRIN
T#J,Y$V$L$B$P$F$U$Q$V$Z$:PRINT#J
,Y$V$C$Q$D$U$R$V$Z$:PRINT#J,Y$V$
B$P$E$B$U$Q$V$Z$:PRINT#J,Y$V$B$Q
$C$L$B$U$Q$V$Z$:PRINT#J,Y$V$B$W$
P$V$Z$
58 PRINT#J,Y$V$B$W$M$A$M$V$Z$:PR
INT#J,Y$V$B$W$M$B$L$V$Z$:PRINT#J
,Y$V$C$W$M$B$V$Z$:PRINT#J,Y$V$C$
U$M$A$U$M$B$V$Z$:PRINT#J,Y$V$D$U
$C$U$C$V$Z$:PRINT#J,Y$V$J$G$L$V$
Z$:PRINT#J,Y$V$L$B$L$I$A$L$I$C$L
$V$Z$:PRINT#J,Y$V$L$B$W$L$C$V$Z$
:PRINT#J,Y$V$M$J$E$B$V$Z$
59 FORX=1TO2:PRINT#J,Y$V$N$J$E$L
$V$Z$:NEXT:PRINT#J,Y$V$O$B$S$C$U
$C$V$Z$:PRINT#J,Y$V$O$A$U$A$U$M$
B$V$Z$:PRINT#J,Y$V$W$P$B$V$Z$:PR
INT#J,Y$V$W$O$B$L$V$Z$:PRINT#J,Y
$V$W$O$A$M$V$Z$:FORX=1TO3:GOSUB9
98:NEXT:GOTO1
60 GOSUB1048:PRINT#J,Y$V$A$U$N$C
$U$C$V$Z$:PRINT#J,Y$V$U$P$C$U$B$
V$Z$:PRINT#J,Y$V$U$Q$C$T$B$V$Z$:
PRINT#J,Y$V$U$P$E$R$B$L$V$Z$:PRI
NT#J,Y$V$U$N$G$Q$A$M$V$Z$:PRINT#
J,Y$V$U$L$D$M$E$S$V$Z$:PRINT#J,Y
$V$T$D$M$G$R$V$Z$:PRINT#J,Y$V$R$
D$M$E$N$C$Q$V$Z$
61 PRINT#J,Y$V$P$D$M$E$Q$C$M$B$L
$V$Z$:PRINT#J,Y$V$N$D$M$E$T$C$M$
B$V$Z$:PRINT#J,Y$V$L$D$M$E$U$M$C
$L$B$V$Z$:PRINT#J,Y$V$C$M$E$U$P$
E$V$Z$:PRINT#J,Y$V$A$M$E$V$O$D$V
$Z$
62 PRINT#J,Y$V$L$E$V$R$B$L$V$Z$:
PRINT#J,Y$V$L$C$W$L$B$V$Z$:PRINT
#J,Y$V$C$W$M$B$V$Z$:PRINT#J,Y$V$
```

The art of entertainment



Pinball Factory *by Kary McFadden*

The video game comes full circle in this glorious tribute to the original. Classic pinball spings to life as never before, with fresh new angles that only the computer can offer. Crisp graphics, sound, and fast, smooth action give this machine-language arcade game a realistic, responsive feel you'll hardly believe. There are even "tilt" buttons that let you "bump" the machine!

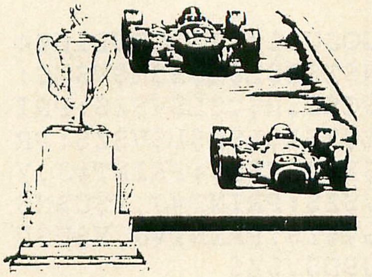
In addition to playing a great game of pinball, you can enjoy hours of creative pleasure as you design, build, and edit your own screens. Save and load your favorite creations. The joystick-controlled cursor makes it all easy.

Change the board: build with bumpers, tabs, and a multitude of solid obstacles to form any configuration imaginable.

Change the face: draw your own title board with lines, rays, and shape patterns. Add text in three different colors, and two dirrent sizes.

Change the rules: alter the gravity, bounce, and scoring!

64K Color Computer required. $34.95



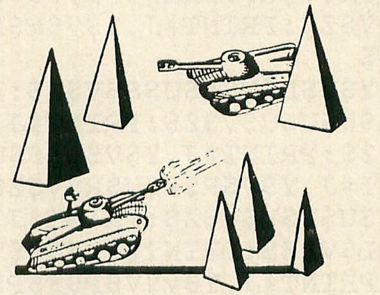
Speed Racer *by Steven Hirsch*

The checkered flag drops as your pulse rises in this lively new arcade game. The road twists to the horizon on the 3-D panorama that sets the stage for the most exciting race the CoCo has ever seen!

Vie for time as you speed through the curves at incredible speeds. Step through the gears to stay ahead of the pack, but step lively since some will stop at nothing to see the end of the race, or the end of you!

Four challenging raceways, complete with obstacles and colorful 3-D scenery, put your skills to the test in this Pole Position™ type game.

32K Color Computer required. $34.95



Rommel 3-D *by Kary McFadden*

You clutch the tank controls, searching for any sign of the enemy. Suddenly a blip appears on radar! Frantically, you move your tank into position. At last you spot the elusive enemy tank! Facing it, you race to lock sights and fire before he does!

Enter the ultimate battle-zone in this exciting 3-D tank combat game. Strategy, speed, and your tank's cannon are your only hope as you wind through a three-dimensional course inhabited by impenetrable barriers and enemy tanks.

Dazzling graphics and lifelike sound take you a step beyond the ordinary in this fast, machine-language arcade game. Enter the next dimension, ROMMEL'S troops are waiting for you!

32K Color Computer required. $29.95

MichTron

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Orders and Information (313) 334-5700
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```
B$W$N$A$L$V$Z$:PRINT#J,Y$V$B$W$M
$A$M$V$Z$:PRINT#J,Y$V$L$B$W$O$V$
Z$:PRINT#J,Y$V$M$A$W$O$V$Z$:FORX
=1TO3:GOSUB998:NEXT:GOTO1
63 GOSUB1048:PRINT#J,Y$V$D$W$C$V
$Z$:GOSUB1044:GOSUB1044:PRINT#J,
Y$V$C$V$U$B$L$V$Z$:PRINT#J,Y$V$C
$V$U$A$M$V$Z$:FORX=1TO3:PRINT#J,
Y$V$C$W$O$V$Z$:NEXT:PRINT#J,Y$V$
L$C$W$N$V$Z$:PRINT#J,Y$V$L$D$W$M
$V$Z$
64 PRINT#J,Y$V$L$E$W$L$V$Z$:PRIN
T#J,Y$V$L$B$E$M$B$U$S$V$Z$:PRINT
#J,Y$V$I$B$U$S$V$Z$:PRINT#J,Y$V$
L$B$L$B$L$C$U$U$V$Z$:FORX=1TO3:G
OSUB998:NEXT:GOTO1
65 PRINT#J,Y$V$M$A$W$L$A$M$V$Z$:
PRINT#J,Y$V$L$A$W$M$B$L$V$Z$:PRI
NT#J,Y$V$B$W$N$B$V$Z$:PRINT#J,Y$
V$B$U$N$A$U$M$B$V$Z$:PRINT#J,Y$V
$L$B$U$L$C$U$C$V$Z$:PRINT#J,Y$V$
J$G$L$V$Z$:GOSUB1012:PRINT#J,Y$V
$C$U$R$D$M$D$V$Z$:PRINT#J,Y$V$B$
U$Q$D$M$F$V$Z$
66 PRINT#J,Y$V$L$A$V$D$M$F$M$V$Z
$:PRINT#J,Y$V$M$A$U$L$D$M$F$O$V$
Z$:PRINT#J,Y$V$U$M$D$M$F$Q$V$Z$:
PRINT#J,Y$V$U$D$M$F$S$V$Z$:PRINT
#J,Y$V$S$D$M$F$U$V$Z$:PRINT#J,Y$
V$Q$D$M$F$U$M$V$Z$:PRINT#J,Y$V$O
$D$M$F$U$O$V$Z$:PRINT#J,Y$V$M$D$
M$F$U$Q$V$Z$
67 PRINT#J,Y$V$D$M$F$U$S$V$Z$:PR
INT#J,Y$V$L$H$U$U$V$Z$:PRINT#J,Y
$V$M$E$W$V$Z$:PRINT#J,Y$V$O$F$U$
U$V$Z$:PRINT#J,Y$V$R$F$U$R$V$Z$:
PRINT#J,Y$V$U$F$V$V$Z$:PRINT#J,Y
$V$U$N$F$U$L$V$Z$:PRINT#J,Y$V$V$
M$F$S$V$Z$:PRINT#J,Y$V$V$P$F$P$V
$Z$
68 PRINT#J,Y$V$L$J$F$M$V$Z$:GOSU
B1012:PRINT#J,Y$V$C$W$L$C$V$Z$:G
OSUB1014:GOSUB1012:GOSUB1012:PRI
NT#J,Y$V$C$U$L$C$U$C$V$Z$:PRINT#
J,Y$V$B$U$N$A$U$M$B$V$Z$:PRINT#J
,Y$V$B$W$N$B$V$Z$:PRINT#J,Y$V$L$
B$W$L$B$L$V$Z$
69 PRINT#J,Y$V$M$A$W$L$A$M$V$Z$:
FORX=1TO3:GOSUB998:NEXT:GOTO1
70 PRINT#J,Y$V$M$A$W$O$V$Z$:PRIN
T#J,Y$V$L$A$W$M$A$M$V$Z$:PRINT#J
,Y$V$B$W$M$B$L$V$Z$:PRINT#J,Y$V$
B$U$N$A$U$M$B$V$Z$:PRINT#J,Y$V$L
$B$U$L$C$U$C$V$Z$:PRINT#J,Y$V$J$
G$L$V$Z$:GOSUB1012:PRINT#J,Y$V$U
$U$D$M$D$V$Z$:PRINT#J,Y$V$U$S$D$
M$F$V$Z$
71 PRINT#J,Y$V$U$Q$D$M$F$M$V$Z$:
PRINT#J,Y$V$V$D$M$F$O$V$Z$:PRINT
#J,Y$V$U$M$D$M$F$Q$V$Z$:PRINT#J,
Y$V$U$D$M$F$S$V$Z$:PRINT#J,Y$V$S
$D$M$F$U$V$Z$:PRINT#J,Y$V$Q$D$M$
F$T$A$M$V$Z$:PRINT#J,Y$V$O$D$M$F
$U$L$B$L$V$Z$:PRINT#J,Y$V$M$D$M$
F$V$B$V$Z$
72 PRINT#J,Y$V$D$M$F$N$A$U$M$B$V
$Z$:PRINT#J,Y$V$C$L$F$O$C$U$C$V$
Z$:GOSUB1012:PRINT#J,Y$V$L$J$G$V
$Z$:PRINT#J,Y$V$C$U$L$C$U$B$L$V$
Z$:PRINT#J,Y$V$B$U$N$A$U$M$B$V$Z
$
73 PRINT#J,Y$V$B$W$N$B$V$Z$:PRIN
T#J,Y$V$L$B$W$M$A$L$V$Z$:PRINT#J
,Y$V$M$A$W$L$A$M$V$Z$:FORX=1TO3:
GOSUB998:NEXT:GOTO1
74 GOSUB1048:PRINT#J,Y$V$V$L$D$R
$D$V$Z$:PRINT#J,Y$V$V$L$C$T$C$V$
Z$:FORX=1TO3:PRINT#J,Y$V$V$L$B$U
$L$B$V$Z$:NEXT:PRINT#J,Y$V$V$L$C
$T$C$V$Z$:PRINT#J,Y$V$V$L$D$R$D$
V$Z$:PRINT#J,Y$V$V$L$I$E$V$Z$:PR
INT#J,Y$V$V$L$B$L$H$L$B$V$Z$
75 PRINT#J,Y$V$V$L$C$T$C$V$Z$:PR
INT#J,Y$V$V$L$E$B$L$B$E$V$Z$:PRI
NT#J,Y$V$V$M$I$C$L$V$Z$:PRINT#J,
Y$V$V$N$I$B$L$V$Z$:PRINT#J,Y$V$V
$R$C$Q$V$Z$:PRINT#J,Y$V$V$S$A$R$
V$Z$:FORX=1TO3:GOSUB998:NEXT:GOT
O1
76 GOSUB1000:GOSUB1002:GOSUB1004
:PRINT#J,Y$V$N$I$B$L$I$B$M$V$Z$:
PRINT#J,Y$V$M$C$V$R$C$L$V$Z$:PRI
NT#J,Y$V$M$A$L$J$A$L$B$L$V$Z$:PR
INT#J,Y$V$M$J$F$L$V$Z$:PRINT#J,Y
$U$M$A$M$J$G$V$Z$:PRINT#J,Y$U$N$
A$L$E$S$C$S$E$V$Z$:PRINT#J,Y$U$N
$A$L$C$U$L$A$U$D$V$Z$
77 FORX=1TO4:PRINT#J,Y$U$N$D$W$M
$B$V$Z$:NEXT:PRINT#J,Y$U$M$E$W$M
$B$V$Z$:PRINT#J,Y$U$M$E$B$U$A$U$
D$V$Z$:PRINT#J,Y$U$L$H$S$C$S$E$V
$Z$:PRINT#J,Y$U$L$C$L$I$I$H$V$Z$
:PRINT#J,Y$U$L$C$M$J$F$L$V$Z$:PR
INT#J,Y$U$L$C$M$B$L$J$L$B$L$V$Z$
78 PRINT#J,Y$U$L$B$N$C$V$R$C$L$V
$Z$:PRINT#J,Y$U$L$B$O$I$B$L$I$B$
M$V$Z$:PRINT#J,Y$U$L$B$P$J$B$N$V
$Z$:PRINT#J,Y$U$L$B$U$P$C$U$N$V$
Z$:PRINT#J,Y$U$L$C$U$P$A$V$V$Z$
79 PRINT#J,Y$U$M$B$W$R$V$Z$:PRIN
T#J,Y$U$N$B$W$Q$V$Z$:PRINT#J,Y$U
$O$B$W$P$V$Z$:FORX=1TO3:GOSUB998
:NEXT:GOTO1
80 GOSUB1048:PRINT#J,Y$V$U$P$D$R
$D$V$Z$:PRINT#J,Y$V$U$P$C$T$C$V$
Z$:FORX=1TO3:PRINT#J,Y$V$U$P$B$U
```

```
$L$B$V$Z$:NEXT:PRINT#J,Y$V$V$D$T
$C$V$Z$:PRINT#J,Y$V$U$N$F$R$D$V$
Z$:GOSUB1022:PRINT#J,Y$V$I$D$L$B
$L$H$L$B$V$Z$:PRINT#J,Y$V$C$U$M$
C$T$C$V$Z$
81 PRINT#J,Y$V$B$L$I$H$L$B$E$V$Z
$:PRINT#J,Y$V$L$I$E$L$I$B$L$V$Z$
:PRINT#J,Y$V$L$I$D$N$I$A$L$V$Z$:
PRINT#J,Y$V$C$U$S$C$Q$V$Z$:PRINT
#J,Y$V$B$U$U$A$R$V$Z$:PRINT#J,Y$
V$B$W$P$V$Z$
82 PRINT#J,Y$V$L$B$W$O$V$Z$:PRIN
T#J,Y$V$M$A$W$O$V$Z$:FORX=1TO3:G
OSUB998:NEXT:GOTO1
83 PRINT#J,Y$V$A$L$B$L$C$U$F$Q$V
$Z$:PRINT#J,Y$V$L$G$S$H$O$V$Z$:P
RINT#J,Y$V$L$H$Q$C$M$F$N$V$Z$:PR
INT#J,Y$V$L$E$N$B$O$C$L$H$M$V$Z$
:PRINT#J,Y$V$L$D$T$C$L$I$A$L$V$Z
$:PRINT#J,Y$V$E$S$C$L$I$B$L$V$Z$
:PRINT#J,Y$V$D$Q$E$L$E$P$D$V$Z$
84 PRINT#J,Y$V$D$Q$D$L$E$R$C$V$Z
$:PRINT#J,Y$V$D$Q$B$M$E$S$C$V$Z$
:PRINT#J,Y$V$D$Q$C$L$D$T$C$V$Z$:
PRINT#J,Y$V$D$P$C$L$D$U$C$V$Z$:P
RINT#J,Y$V$E$N$C$L$E$U$C$V$Z$:PR
INT#J,Y$V$I$L$F$U$C$V$Z$:PRINT#J
,Y$V$H$L$E$U$M$C$V$Z$:PRINT#J,Y$
V$D$L$C$L$E$U$M$D$V$Z$
85 PRINT#J,Y$V$E$N$E$R$B$N$C$M$V
$Z$:PRINT#J,Y$V$L$I$A$T$G$L$V$Z$
:PRINT#J,Y$V$L$I$U$L$G$V$Z$:PRIN
T#J,Y$V$M$G$U$N$C$L$B$L$V$Z$:PRI
NT#J,Y$V$O$E$V$R$V$Z$:FORX=1TO3:
GOSUB998:NEXT:GOTO1
86 GOSUB1052:GOSUB1054:GOSUB1056
:GOSUB1058:GOSUB1060:GOSUB1062:G
OSUB1064:GOSUB1066:GOSUB1068:GOS
UB1012:PRINT#J,Y$V$L$I$D$L$I$D$V
$Z$:PRINT#J,Y$V$C$W$D$V$Z$:GOSUB
1014:GOSUB1014:GOSUB1012
87 GOSUB1068:GOSUB1066:GOSUB1064
:GOSUB1062:GOSUB1060:GOSUB1058:G
OSUB1056:GOSUB1054:GOSUB1052:FOR
X=1TO3:GOSUB998:NEXT:GOTO1
88 PRINT#J,Y$V$W$O$A$M$V$Z$:PRIN
T#J,Y$V$W$O$B$L$V$Z$:PRINT#J,Y$V
$W$P$B$V$Z$:PRINT#J,Y$V$U$P$A$U$
M$B$V$Z$:PRINT#J,Y$V$V$C$U$C$V$Z
$:PRINT#J,Y$V$P$J$C$L$V$Z$:PRINT
#J,Y$V$N$I$B$L$I$C$L$V$Z$:PRINT#
J,Y$V$M$C$V$S$C$V$Z$:PRINT#J,Y$V
$L$C$L$J$D$V$Z$:GOSUB1012
89 PRINT#J,Y$V$J$G$L$V$Z$:PRINT#
J,Y$V$E$T$C$U$C$V$Z$:PRINT#J,Y$V
$D$U$L$A$U$M$B$V$Z$:PRINT#J,Y$V$
C$W$M$B$V$Z$:PRINT#J,Y$V$C$W$L$B
$L$V$Z$:PRINT#J,Y$V$C$W$L$A$M$V$
Z$:FORX=1TO2:PRINT#J,Y$V$C$W$O$V
$Z$:NEXT:PRINT#J,Y$V$C$W$L$A$M$V
$Z$
90 PRINT#J,Y$V$C$W$L$B$L$V$Z$:PR
INT#J,Y$V$L$C$W$L$B$V$Z$:PRINT#J
,Y$V$L$D$U$A$U$M$B$V$Z$:PRINT#J,
Y$V$M$D$S$C$U$C$V$Z$:PRINT#J,Y$V
$N$J$E$L$V$Z$:PRINT#J,Y$V$P$J$C$
L$V$Z$
91 PRINT#J,Y$V$V$C$U$C$V$Z$:PRIN
T#J,Y$V$V$L$A$U$M$B$V$Z$:PRINT#J
,Y$V$W$P$B$V$Z$:PRINT#J,Y$V$W$O$
B$L$V$Z$:PRINT#J,Y$V$W$O$A$M$V$Z
$:FORX=1TO3:GOSUB998:NEXT:GOTO1
92 GOSUB1070:PRINT#J,Y$V$N$E$V$S
$V$Z$:PRINT#J,Y$V$P$E$U$U$V$Z$:P
RINT#J,Y$V$R$E$U$S$V$Z$:PRINT#J,
Y$V$T$E$V$M$V$Z$:PRINT#J,Y$V$U$L
$E$V$V$Z$:PRINT#J,Y$V$U$N$E$T$A$
M$V$Z$:PRINT#J,Y$V$V$L$E$S$A$L$V
$Z$:PRINT#J,Y$V$V$N$E$Q$B$V$Z$:P
RINT#J,Y$V$V$P$E$O$B$V$Z$
93 PRINT#J,Y$V$V$R$E$L$B$L$V$Z$:
PRINT#J,Y$V$W$E$B$V$Z$:PRINT#J,Y
$V$W$M$D$L$V$Z$:PRINT#J,Y$V$W$O$
C$V$Z$:PRINT#J,Y$V$W$P$B$V$Z$:PR
INT#J,Y$V$W$P$A$L$V$Z$:PRINT#J,Y
$V$W$O$A$M$V$Z$:FORX=1TO3:GOSUB9
98:NEXT:GOTO1
94 GOSUB1070:PRINT#J,Y$V$N$F$V$R
$V$Z$:PRINT#J,Y$V$P$E$U$U$V$Z$:P
RINT#J,Y$V$R$B$E$V$M$V$Z$:PRINT#
J,Y$V$U$F$V$V$Z$:PRINT#J,Y$V$U$N
$F$U$L$V$Z$:PRINT#J,Y$V$V$M$F$S$
V$Z$:PRINT#J,Y$V$U$N$F$U$L$V$Z$:
PRINT#J,Y$V$U$F$V$V$Z$:PRINT#J,Y
$V$R$B$E$V$M$V$Z$
95 PRINT#J,Y$V$P$E$U$U$V$Z$:PRIN
T#J,Y$V$H$V$R$V$Z$:PRINT#J,Y$V$L
$F$W$V$Z$:PRINT#J,Y$V$O$F$U$U$V$
Z$:PRINT#J,Y$V$R$F$V$N$V$Z$:PRIN
T#J,Y$V$U$F$U$L$A$M$V$Z$:PRINT#J
,Y$V$U$N$F$T$B$V$Z$:PRINT#J,Y$V$
V$M$F$Q$B$V$Z$:PRINT#J,Y$V$V$P$F
$M$B$L$V$Z$
96 PRINT#J,Y$V$V$S$G$V$Z$:PRINT#
J,Y$V$W$M$D$L$V$Z$:PRINT#J,Y$V$W
$O$C$V$Z$:PRINT#J,Y$V$W$P$B$V$Z$
:PRINT#J,Y$V$W$P$A$L$V$Z$:PRINT#
J,Y$V$W$O$A$M$V$Z$:FORX=1TO3:GOS
UB998:NEXT:GOTO1
97 PRINT#J,Y$V$M$A$W$L$A$M$V$Z$:
PRINT#J,Y$V$L$A$W$M$B$L$V$Z$:PRI
NT#J,Y$V$B$W$N$B$V$Z$:PRINT#J,Y$
V$C$W$M$B$V$Z$:PRINT#J,Y$V$L$C$W
$L$B$V$Z$:PRINT#J,Y$V$E$V$R$D$V$
Z$:PRINT#J,Y$V$L$E$V$O$E$L$V$Z$:
PRINT#J,Y$V$C$M$C$V$B$E$L$V$Z$
```

```
98 PRINT#J,Y$V$B$O$C$U$L$D$M$D$V
$Z$:PRINT#J,Y$V$L$A$Q$B$S$D$M$F$
V$Z$:PRINT#J,Y$V$M$A$Q$C$O$D$M$B
$E$L$V$Z$:PRINT#J,Y$V$U$G$M$H$L$
V$Z$:PRINT#J,Y$V$M$A$T$D$M$F$N$C
$V$Z$:PRINT#J,Y$V$L$B$R$D$M$F$Q$
B$V$Z$:PRINT#J,Y$V$B$O$D$M$F$T$B
$L$V$Z$
99 PRINT#J,Y$V$C$L$D$M$H$S$A$M$V
$Z$:PRINT#J,Y$V$L$E$M$F$O$B$U$V$
Z$:PRINT#J,Y$V$L$C$M$F$R$C$P$A$M
$V$Z$:PRINT#J,Y$V$I$U$C$P$A$L$V$
Z$:PRINT#J,Y$V$G$V$C$N$B$V$Z$:PR
INT#J,Y$V$L$E$V$N$C$L$C$V$Z$:PRI
NT#J,Y$V$L$C$V$R$D$L$V$Z$
100 PRINT#J,Y$V$B$W$L$D$V$Z$:PRI
NT#J,Y$V$B$W$M$B$L$V$Z$:PRINT#J,
Y$V$L$B$W$M$B$V$Z$:PRINT#J,Y$V$M
$A$W$M$B$V$Z$:PRINT#J,Y$V$W$P$A$
L$V$Z$:PRINT#J,Y$V$W$O$A$M$V$Z$:
FORX=1TO3:GOSUB998:NEXT:GOTO1
101 PRINT#J,Y$V$W$O$A$M$V$Z$:PRI
NT#J,Y$V$W$O$B$L$V$Z$:FORX=1TO2:
PRINT#J,Y$V$W$P$B$V$Z$:NEXT:PRIN
T#J,Y$V$W$N$D$V$Z$:PRINT#J,Y$V$W
$L$E$L$V$Z$:PRINT#J,Y$V$M$A$U$T$
B$E$L$V$Z$:PRINT#J,Y$V$L$B$U$R$D
$M$D$V$Z$:PRINT#J,Y$V$B$U$Q$D$M$
F$V$Z$
102 PRINT#J,Y$V$B$O$A$T$D$M$B$E$
L$V$Z$:PRINT#J,Y$V$C$M$C$Q$D$M$H
$L$V$Z$:PRINT#J,Y$V$L$I$E$M$F$N$
C$V$Z$:PRINT#J,Y$V$L$E$L$B$E$M$F
$Q$B$V$Z$:PRINT#J,Y$V$C$S$H$S$B$
V$Z$:PRINT#J,Y$V$I$G$T$B$L$V$Z$:
PRINT#J,Y$V$L$I$E$U$L$A$M$V$Z$:P
RINT#J,Y$V$L$G$H$U$M$V$Z$
103 PRINT#J,Y$V$C$M$C$S$D$R$A$M$
V$Z$:PRINT#J,Y$V$B$O$A$U$L$D$Q$A
$L$V$Z$:PRINT#J,Y$V$B$V$O$D$O$B$
V$Z$:PRINT#J,Y$V$L$B$U$T$D$L$C$V
$Z$
104 PRINT#J,Y$V$W$N$D$V$Z$:PRINT
#J,Y$V$W$O$B$L$V$Z$:FORX=1TO2:PR
INT#J,Y$V$W$P$B$V$Z$:NEXT:PRINT#
J,Y$V$W$P$A$L$V$Z$:PRINT#J,Y$V$W
$O$A$M$V$Z$:FORX=1TO3:GOSUB998:N
EXT:GOTO1
105 PRINT#J,Y$V$L$B$U$R$C$L$B$L$
C$V$Z$:PRINT#J,Y$V$B$U$R$I$A$V$Z
$:PRINT#J,Y$V$B$U$Q$B$M$E$B$L$V$
Z$:PRINT#J,Y$V$C$V$R$E$L$V$Z$:PR
INT#J,Y$V$L$C$V$R$D$L$V$Z$:PRINT
#J,Y$V$L$E$U$U$C$L$V$Z$:PRINT#J,
Y$V$B$L$E$U$T$C$V$Z$:PRINT#J,Y$V
$D$M$D$V$N$C$V$Z$
106 PRINT#J,Y$V$L$E$M$D$U$P$C$V$
Z$:PRINT#J,Y$V$L$E$B$M$D$U$N$C$V
$Z$:PRINT#J,Y$V$I$M$D$U$L$C$V$Z$
:PRINT#J,Y$V$D$M$F$M$D$T$C$V$Z$:
PRINT#J,Y$V$C$P$F$M$D$R$C$V$Z$:P
RINT#J,Y$V$C$R$F$M$D$P$C$V$Z$:PR
INT#J,Y$V$C$T$F$M$D$M$D$V$Z$
107 PRINT#J,Y$V$C$U$L$F$M$G$V$Z$
:PRINT#J,Y$V$C$U$N$F$M$E$L$V$Z$:
PRINT#J,Y$V$C$V$L$F$M$C$L$V$Z$:P
RINT#J,Y$V$C$U$R$F$M$B$V$Z$:PRIN
T#J,Y$V$L$C$U$S$G$V$Z$:PRINT#J,Y
$V$L$D$U$T$E$L$V$Z$
108 PRINT#J,Y$V$L$E$U$U$C$L$V$Z$
:PRINT#J,Y$V$L$E$B$M$B$V$L$C$V$Z
$:PRINT#J,Y$V$I$A$V$N$B$V$Z$:PRI
NT#J,Y$V$C$L$B$L$C$U$S$B$V$Z$:PR
INT#J,Y$V$W$O$B$L$V$Z$:FORX=1TO3
:GOSUB998:NEXT:GOTO1
109 PRINT#J,Y$V$R$A$V$S$V$Z$:PRI
NT#J,Y$V$Q$C$V$R$V$Z$:PRINT#J,Y$
V$M$I$A$P$A$U$L$V$Z$:PRINT#J,Y$V
$L$F$L$F$O$B$U$V$Z$:PRINT#J,Y$V$
C$T$C$O$B$T$V$Z$:PRINT#J,Y$V$B$L
$H$L$B$O$B$T$V$Z$:FORX=1TO2:PRIN
T#J,Y$V$I$E$O$B$T$V$Z$:NEXT:PRIN
T#J,Y$V$D$R$D$O$B$T$V$Z$
110 FORX=1TO3:PRINT#J,Y$V$C$T$C$
O$B$T$V$Z$:NEXT:PRINT#J,Y$V$C$T$
```

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```
B$P$B$T$V$Z$:PRINT#J,Y$V$M$B$R$B
$P$C$T$V$Z$:PRINT#J,Y$V$L$I$H$U$
V$Z$:PRINT#J,Y$V$I$H$U$L$V$Z$:PR
INT#J,Y$V$B$W$P$V$Z$:PRINT#J,Y$V
$A$W$Q$V$Z$:FORX=1TO3:GOSUB998:N
EXT:GOTO1
111 PRINT#J,Y$V$A$W$P$A$V$Z$:PRI
NT#J,Y$V$B$W$N$B$V$Z$:GOSUB1014:
GOSUB1012:PRINT#J,Y$V$M$B$U$N$B$
U$L$V$Z$:PRINT#J,Y$V$L$B$V$L$B$U
$V$Z$:FORX=1TO2:PRINT#J,Y$V$C$V$
L$C$T$V$Z$:NEXT:PRINT#J,Y$V$D$U$
N$D$T$V$Z$:GOSUB1076:FORX=1TO3:G
OSUB998:NEXT:GOTO1
112 GOSUB1078:PRINT#J,Y$V$C$Q$C$
Q$C$T$V$Z$:PRINT#J,Y$V$B$S$A$S$B
$T$V$Z$:FORX=1TO3:PRINT#J,Y$V$B$
U$R$B$T$V$Z$:NEXT:PRINT#J,Y$V$L$
B$U$P$B$U$V$Z$:PRINT#J,Y$V$M$B$U
$N$B$U$L$V$Z$:FORX=1TO3:GOSUB998
:NEXT:GOTO1
113 GOSUB1078:PRINT#J,Y$V$D$U$N$
D$T$V$Z$:FORX=1TO2:PRINT#J,Y$V$C
$V$L$C$T$V$Z$:NEXT:PRINT#J,Y$V$L
$B$U$P$B$U$V$Z$:PRINT#J,Y$V$M$B$
U$N$B$L$U$V$Z$:GOSUB1012:GOSUB10
14:PRINT#J,Y$V$B$W$N$B$V$Z$:PRIN
T#J,Y$V$A$W$P$A$V$Z$:FORX=1TO3:G
OSUB998:NEXT:GOTO1
114 GOSUB1078:PRINT#J,Y$V$C$S$C$
O$C$T$V$Z$:FORX=1TO3:PRINT#J,Y$V
$B$T$B$Q$B$T$V$Z$:NEXT:PRINT#J,Y
$V$B$T$C$O$C$T$V$Z$:PRINT#J,Y$V$
L$B$T$G$U$V$Z$:PRINT#J,Y$V$M$B$T
$F$U$L$V$Z$:FORX=1TO3:GOSUB998:N
EXT:GOTO1
115 PRINT#J,Y$V$A$V$A$V$V$Z$:PRI
NT#J,Y$V$B$U$M$C$U$N$V$Z$:PRINT#
J,Y$V$J$B$E$M$V$Z$:PRINT#J,Y$V$I
$E$L$I$C$L$V$Z$:PRINT#J,Y$V$C$W$
L$C$V$Z$:PRINT#J,Y$V$B$L$J$C$L$B
$V$Z$:GOSUB1022:PRINT#J,Y$V$M$J$
E$B$V$Z$:PRINT#J,Y$V$V$L$B$U$C$V
$Z$
116 FORX=1TO2:PRINT#J,Y$V$V$L$B$
U$L$B$V$Z$:NEXT:PRINT#J,Y$V$U$L$
B$L$C$L$B$S$B$V$Z$:PRINT#J,Y$V$U
$M$E$B$T$B$V$Z$:PRINT#J,Y$V$U$M$
B$L$A$L$B$S$B$L$V$Z$:PRINT#J,Y$V
$W$N$B$M$V$Z$:FORX=1TO3:GOSUB998
:NEXT:GOTO1
117 PRINT#J,Y$V$U$A$U$T$V$Z$:PRI
NT#J,Y$V$T$C$U$S$V$Z$:PRINT#J,Y$
V$M$I$B$E$U$L$V$Z$:PRINT#J,Y$R$B
$Q$H$L$H$U$V$Z$:PRINT#J,Y$Q$B$Q$
C$U$P$C$T$V$Z$:PRINT#J,Y$P$B$R$B
$L$I$E$L$B$T$V$Z$:FORX=1TO2:PRIN
T#J,Y$P$B$R$J$T$V$Z$:NEXT:PRINT#
J,Y$P$B$R$D$U$N$D$T$V$Z$
118 FORX=1TO2:PRINT#J,Y$P$B$R$C$
U$P$C$T$V$Z$:NEXT:PRINT#J,Y$P$B$
S$B$U$P$C$T$V$Z$:PRINT#J,Y$P$C$S
$B$U$O$C$T$V$Z$:PRINT#J,Y$Q$J$B$
E$U$V$Z$:PRINT#J,Y$R$J$E$L$U$V$Z
$:FORX=1TO3:GOSUB998:NEXT:GOTO1
119 PRINT#J,Y$V$A$W$P$A$V$Z$:PRI
NT#J,Y$V$B$W$N$B$V$Z$:GOSUB1014:
GOSUB1012:PRINT#J,Y$V$U$R$B$U$L$
V$Z$:PRINT#J,Y$V$U$S$B$U$V$Z$:FO
RX=1TO2:PRINT#J,Y$V$U$T$B$T$V$Z$
:NEXT:PRINT#J,Y$V$U$S$C$T$V$Z$:P
RINT#J,Y$V$M$I$H$T$V$Z$:PRINT#J,
Y$V$L$I$I$T$V$Z$
120 PRINT#J,Y$V$B$L$I$E$L$B$T$V$
Z$:PRINT#J,Y$V$C$U$P$C$T$V$Z$:PR
INT#J,Y$V$I$L$H$U$V$Z$:PRINT#J,Y
$V$I$H$U$L$V$Z$:PRINT#J,Y$V$B$R$
C$U$S$V$Z$:PRINT#J,Y$V$A$T$A$U$T
$V$Z$:FORX=1TO3:GOSUB998:NEXT:GO
TO1
121 PRINT#J,Y$V$A$T$A$U$L$A$R$V$
Z$:PRINT#J,Y$V$B$R$C$U$B$Q$V$Z$:
PRINT#J,Y$V$I$H$N$F$M$V$Z$:PRINT
#J,Y$V$A$L$G$L$H$M$A$L$E$L$V$Z$:
PRINT#J,Y$V$B$U$R$B$L$B$O$B$V$Z$
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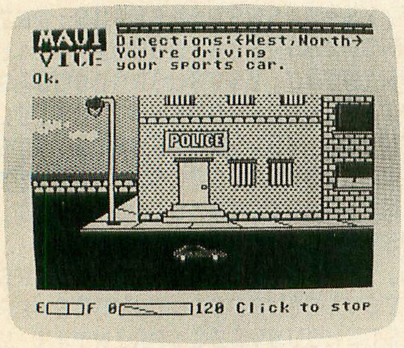
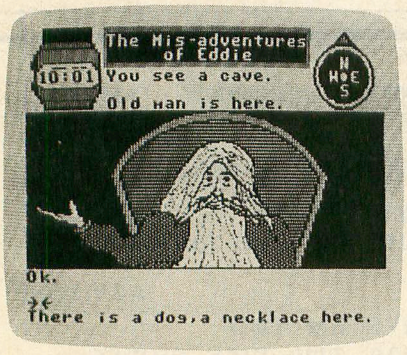

MAUI VICE
Directions:<West,North>
You're driving
your sports car.
Ok.

New Release

Maui Vice

Step into the shoes of Crockett & Tubbs, and gather evidence, photographs and witnesses to convict your suspects! With "windows" to select your options, hi-res graphics, and a new story generated each time you play. This is state-of-the-art that guarantees excitement and newness every time you play.

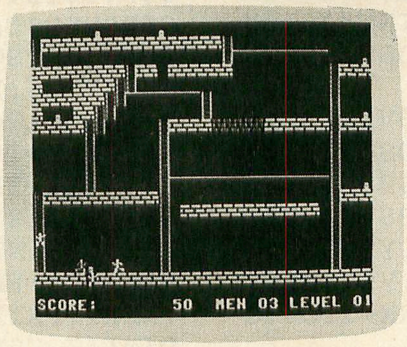
64K Ext. Basic & Joystick Required
Tape $18.95 Disk $21.95


The Mis-adventures
of Eddie
10:01
You see a cave.
Old man is here.
Ok.
><
There is a dog, a necklace here.

The Misadventures of Eddie

Another great Novasoft adventure. The ol' man in the mines' rebellious son, Eddie, is roaming through time, creating havoc—and you must bring him home in order to return to your own time! Over 140 locations, 50+ commands, in hi-res graphics. Experienced adventurers will love this one!

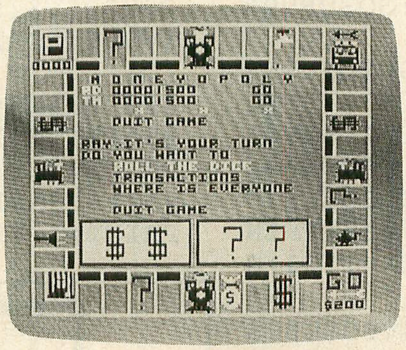
Requires 64K
Disk $21.95


SCORE: 50 MEN 03 LEVEL 01

Goldrunner

Travel the maze in your never-ending search for gold—but beware of trap doors, burly guards and other hazards! 33 screens.

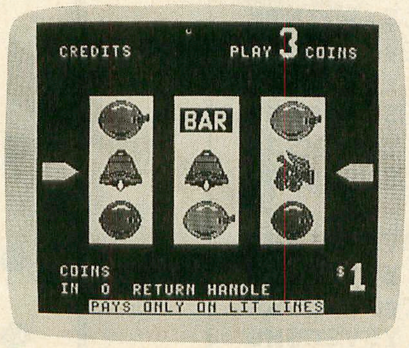
64K Joystick or Keyboard
Tape $14.95 Disk $17.95


MONEYOPOLY
0000|500 00
0000|500 00
QUIT GAME
RAY,IT'S YOUR TURN
DO YOU WANT TO
ROLL THE DICE
TRANSACTIONS
WHERE IS EVERYONE
QUIT GAME

Moneyopoly

Play the popular board game on one of the most realistic computer game simulations ever! Contains all the features of the original. Buy, sell, rent, wheel & deal your way to fortune.

32K Joystick Required
Tape $19.95 Disk $22.95



Vegas Game Pak

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16K Ext. Basic Required
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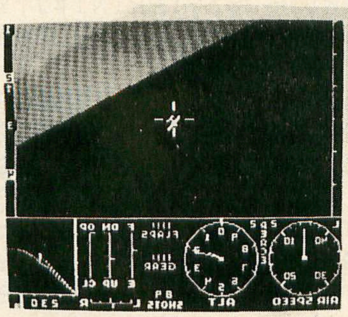
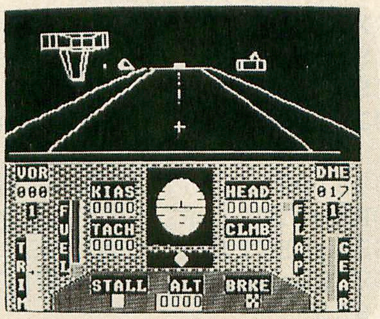


P-51 Mustang Attack/Flight Simulation

The ultimate video experience! Link two CoCo's together by cable or modem, and compete against your opponent across the table OR across the country! (Both computers require a copy of this program). The P-51 flight simulator lets you fly this WWII attack fighter in actual combat situations—against another player OR against the computer.

32K Machine Language
Flight Manual Included
Tape $29.95 Disk $34.95



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Real-time simulation generates panoramic 3-D views of ground features as you fly your sophisticated plane in any of nine different "worlds." Program models over 35 different aircraft/flight parameters. Realistic sound effects too! Manual included helps you through a typical short flight.

32K Machine Language
Flight Manual Included
Joysticks Required
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Teachers Database II—Allows teachers to keep computerized files of students. Recently updated with many new features!

- Up to 100 students, 24 items per student
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64K TDBII $59.95 Disk Only
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Fractions—A Three-Program Package. 1/Mixed & Improper 2/Equivalence 3/Lowest Terms. Practice, review and definitions make learning easy.

32K Ext. Basic
Tape $30.95 Disk $35.95

Factpack—Three programs for home or school use provide drill and practice with basic "-/+/÷/x" Grades 1-6.

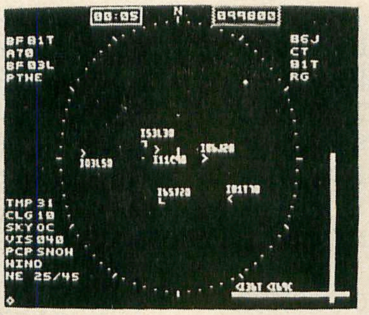
32K Ext. Basic
Tape $24.95 Disk $29.95

Vocabulary Management System—Helps children learn and practice using vocabulary and spelling words. Eleven programs including three printer segments for tests, puzzles, worksheets and five games; many features make this a popular seller!

Requires 16K Ext. Basic/
32K for Printer Output
Tape $39.95 Disk $42.95

Math Duel—A challenging math game that pits you against the computer in a game of wits. Use your knowledge of factors, multiples and prime numbers to gather points against your CoCo.

32K Ext. Basic
Tape $30.95 Disk $35.95



Approach Control Simulation From Betasoft Systems.

"Caught in a blinding snowstorm, two jet airliners are on a collision course. The pilots are unaware of the imminent danger. Hundreds of lives are at stake. A high-speed disaster is inevitable unless you act fast..." This and many other exciting scenarios await you as an Air Traffic Controller. The thrills, challenges and frustrations you'll experience with this authentic, real-time simulation will give you countless hours of discovery and adventure.

32K Machine Language
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New! Tandy 1000/1200/3000 -IBM/PC-Compatable Software!

Inventory Mate --General purpose inventory program suitable for a variety of applications. Inventory turnover and transactions are kept on permanent record. Has automatic item count adjustment when shipping or receiving. Also generates reports suitable for many uses! **$79.95**

Postal Express --Lightning-fast general purpose mail program for home, small business. Each file stores up to 500 entries; in-memory storage for quick operation; automatic selective printing options using global search and categorizing features; Zip Code ordering, alphabetizing, accepts 9-digit and foreign Zips as well! **$49.95**

Special Delivery --Comprehensive mail list program for businesses, featuring versatility found only in much more expensive packages! Up to 2000 entries held in each file; additional address line can be placed anywhere in the individual mailing label; categorize and print entries according to custom needs; Zip Code ordering, alphabetizing, uses 9-digit and foreign Zips, too! **$79.95**

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:PRINT#J,Y$V$I$H$L$A$L$F$L$A$V$Z
$
122 PRINT#J,Y$V$L$I$I$M$E$B$V$Z$
:PRINT#J,Y$V$M$I$H$N$F$V$Z$:PRIN
T#J,Y$V$U$T$B$R$B$V$Z$:PRINT#J,Y
$V$U$U$A$S$A$V$Z$:FORX=1TO3:GOSU
B998:NEXT:GOTO1
123 PRINT#J,Y$S$C$W$U$V$Z$:PRINT
#J,Y$R$C$W$U$L$V$Z$:PRINT#J,Y$Q$
C$W$U$M$V$Z$:PRINT#J,Y$P$C$W$U$N
$V$Z$:FORX=1TO2:PRINT#J,Y$P$B$W$
U$O$V$Z$:NEXT:PRINT#J,Y$P$B$U$R$
A$U$L$A$R$V$Z$:PRINT#J,Y$P$C$U$P
$C$U$B$Q$V$Z$:PRINT#J,Y$P$J$B$E$
N$F$M$V$Z$
124 PRINT#J,Y$P$B$L$I$F$L$H$M$A$
L$E$L$V$Z$:PRINT#J,Y$P$C$W$M$B$L
$B$P$A$V$Z$:PRINT#J,Y$P$J$E$B$L$
A$L$F$L$A$V$Z$:PRINT#J,Y$Q$J$G$M
$E$B$V$Z$:PRINT#J,Y$R$J$B$E$N$F$
V$Z$:PRINT#J,Y$V$U$T$B$R$B$V$Z$:
PRINT#J,Y$V$U$U$A$S$A$V$Z$:FORX=
1TO3:GOSUB998:NEXT:GOTO1
125 PRINT#J,Y$V$A$V$A$U$N$A$V$Z$
:PRINT#J,Y$V$B$U$M$C$U$L$B$V$Z$:
GOSUB1014:GOSUB1012:PRINT#J,Y$V$
V$C$U$N$V$Z$:PRINT#J,Y$V$U$P$C$U
$M$V$Z$:PRINT#J,Y$V$U$N$F$U$L$V$
Z$:PRINT#J,Y$V$U$I$U$V$Z$:PRINT#
J,Y$V$R$F$N$E$T$V$Z$:PRINT#J,Y$V
$O$F$N$H$S$V$Z$
126 PRINT#J,Y$V$M$F$M$F$O$C$M$A$
O$V$Z$:PRINT#J,Y$V$L$C$N$H$P$E$O
$V$Z$:PRINT#J,Y$V$B$M$H$T$C$P$V$
Z$:PRINT#J,Y$V$I$U$U$V$Z$:PRINT#
J,Y$V$E$B$W$V$Z$:PRINT#J,Y$V$D$W
$N$V$Z$
127 PRINT#J,Y$V$C$W$O$V$Z$:PRINT
#J,Y$V$B$W$P$V$Z$:PRINT#J,Y$V$L$
B$W$O$V$Z$:PRINT#J,Y$V$M$B$W$N$V
$Z$:FORX=1TO3:GOSUB998:NEXT:GOTO
1
128 PRINT#J,Y$V$U$P$A$U$N$A$V$Z$
:PRINT#J,Y$V$V$C$U$L$B$V$Z$:PRIN
T#J,Y$V$M$J$B$E$V$Z$:PRINT#J,Y$V
$L$I$D$L$I$B$L$A$V$Z$:PRINT#J,Y$
V$C$W$M$B$V$Z$:PRINT#J,Y$V$B$L$J
$F$V$Z$:PRINT#J,Y$V$J$G$L$V$Z$:P
RINT#J,Y$V$J$B$E$M$V$Z$:PRINT#J,
Y$V$B$W$P$V$Z$
129 PRINT#J,Y$V$A$W$Q$V$Z$:FORX=
1TO3:GOSUB998:NEXT:GOTO1
130 GOSUB1080:PRINT#J,Y$V$B$U$Q$
B$U$V$Z$:PRINT#J,Y$V$A$U$S$B$T$V
$Z$:FORX=1TO2:PRINT#J,Y$V$U$T$B$
T$V$Z$:NEXT:PRINT#J,Y$V$L$I$H$U$
V$Z$:PRINT#J,Y$V$I$H$U$L$V$Z$:PR
INT#J,Y$V$B$U$Q$B$U$V$Z$:PRINT#J
,Y$V$A$U$S$B$T$V$Z$
131 FORX=1TO2:PRINT#J,Y$V$U$T$B$
T$V$Z$:NEXT:PRINT#J,Y$V$L$I$H$U$
V$Z$:PRINT#J,Y$V$I$H$L$U$V$Z$:PR
INT#J,Y$V$B$W$P$V$Z$:PRINT#J,Y$V
$A$W$Q$V$Z$:FORX=1TO3:GOSUB998:N
EXT:GOTO1
132 GOSUB1080:PRINT#J,Y$V$B$U$Q$
B$U$V$Z$:PRINT#J,Y$V$A$U$S$B$T$V
$Z$:FORX=1TO2:PRINT#J,Y$V$U$T$B$
T$V$Z$:NEXT:PRINT#J,Y$V$L$I$H$U$
V$Z$:PRINT#J,Y$V$I$H$U$L$V$Z$:PR
INT#J,Y$V$B$W$P$V$Z$:PRINT#J,Y$V
$A$W$Q$V$Z$:FORX=1TO3:GOSUB998:N
EXT:GOTO1
133 GOSUB1078:PRINT#J,Y$V$C$U$P$
C$T$V$Z$:FORX=1TO3:PRINT#J,Y$V$B
$U$R$B$T$V$Z$:NEXT:PRINT#J,Y$V$C
$U$P$C$T$V$Z$:PRINT#J,Y$V$L$I$H$
U$V$Z$:PRINT#J,Y$V$M$I$B$E$M$T$V
$Z$:FORX=1TO3:GOSUB998:NEXT:GOTO
1
134 PRINT#J,Y$P$A$W$P$A$T$V$Z$:P
RINT#J,Y$P$B$W$N$B$T$V$Z$:PRINT#
J,Y$P$J$H$T$V$Z$:PRINT#J,Y$Q$J$B
$E$L$T$V$Z$:PRINT#J,Y$V$M$B$U$N$
B$M$T$V$Z$:PRINT#J,Y$V$L$B$U$P$B
$U$V$Z$:FORX=1TO2:PRINT#J,Y$V$C$
U$P$C$T$V$Z$:NEXT:PRINT#J,Y$V$D$
U$N$D$T$V$Z$
135 GOSUB1076:FORX=1TO3:GOSUB998
:NEXT:GOTO1
136 GOSUB1078:PRINT#J,Y$V$D$U$N$
D$T$V$Z$:FORX=1TO2:PRINT#J,Y$V$C
$U$P$C$T$V$Z$:NEXT:PRINT#J,Y$V$L
$B$U$P$B$U$V$Z$:PRINT#J,Y$V$M$B$
U$N$B$L$U$V$Z$
137 PRINT#J,Y$Q$J$B$E$U$V$Z$:PRI
NT#J,Y$P$J$H$T$V$Z$:PRINT#J,Y$P$
B$W$N$B$T$V$Z$:PRINT#J,Y$P$A$W$P
$A$T$V$Z$:FORX=1TO3:GOSUB998:NEX
T:GOTO1
138 PRINT#J,Y$V$A$T$A$T$A$T$V$Z$
:PRINT#J,Y$V$B$R$C$R$B$T$V$Z$:PR
INT#J,Y$V$J$T$V$Z$:PRINT#J,Y$V$A
$L$G$L$G$L$A$T$V$Z$:PRINT#J,Y$V$
B$U$R$B$T$V$Z$:PRINT#J,Y$V$J$T$V
$Z$
139 PRINT#J,Y$V$L$I$H$U$V$Z$:PRI
NT#J,Y$V$M$I$B$E$L$U$V$Z$:PRINT#
J,Y$V$U$S$B$U$V$Z$:FORX=1TO3:PRI
NT#J,Y$V$U$T$B$T$V$Z$:NEXT:PRINT
#J,Y$V$U$S$B$U$V$Z$:PRINT#J,Y$V$
U$R$B$L$U$V$Z$:FORX=1TO3:GOSUB99
8:NEXT:GOTO1
140 PRINT#J,Y$V$M$B$T$F$M$T$V$Z$
:PRINT#J,Y$V$L$B$T$G$U$V$Z$:PRIN
T#J,Y$V$B$U$B$L$F$T$V$Z$:PRINT#J
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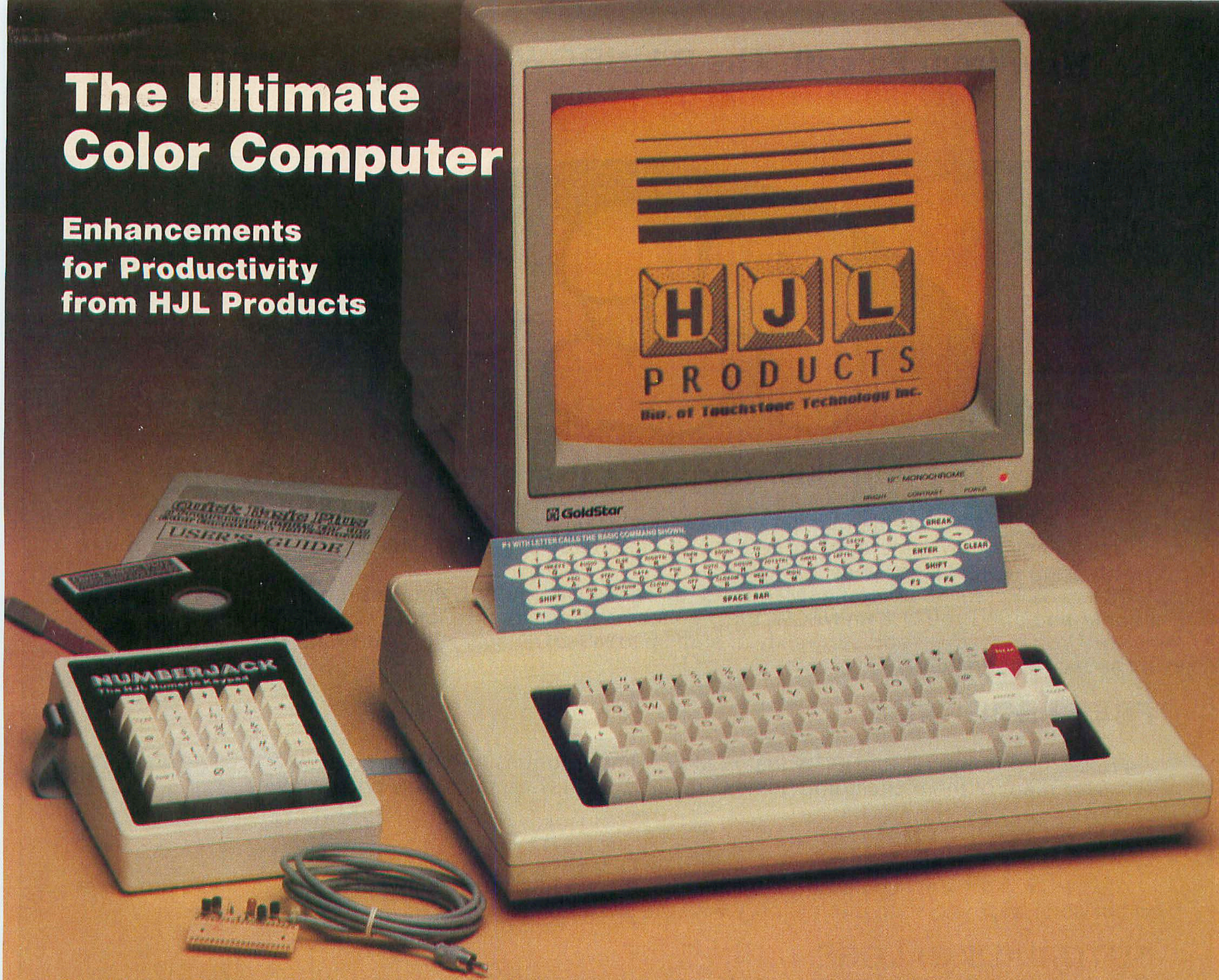

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,Y$V$B$T$B$L$E$B$T$V$Z$:PRINT#J,
Y$V$B$S$B$L$C$M$C$T$V$Z$:PRINT#J
,Y$V$B$Q$D$L$B$O$B$T$V$Z$:PRINT#
J,Y$V$B$Q$C$L$B$P$B$T$V$Z$
141 FORX=1TO2:PRINT#J,Y$V$B$Q$B$
L$B$Q$B$T$V$Z$:NEXT:PRINT#J,Y$V$
B$P$B$L$C$Q$B$T$V$Z$:PRINT#J,Y$V
$C$M$C$L$B$S$B$T$V$Z$:PRINT#J,Y$
V$B$E$L$B$T$B$T$V$Z$:PRINT#J,Y$V
$F$L$B$U$B$T$V$Z$
142 PRINT#J,Y$V$L$G$T$B$U$V$Z$:P
RINT#J,Y$V$M$F$T$B$L$U$V$Z$:FORX
=1TO3:GOSUB998:NEXT:GOTO1
143 PRINT#J,Y$V$U$S$B$L$A$L$B$P$
V$Z$:PRINT#J,Y$V$U$R$H$O$V$Z$:PR
INT#J,Y$V$U$U$C$R$V$Z$:PRINT#J,Y
$V$U$U$L$B$R$V$Z$:PRINT#J,Y$V$A$
U$P$A$O$B$R$V$Z$:PRINT#J,Y$V$B$U
$N$C$N$B$R$V$Z$:PRINT#J,Y$V$J$E$
B$M$V$Z$
144 PRINT#J,Y$V$A$L$I$D$L$I$B$L$
V$Z$:PRINT#J,Y$V$C$W$M$B$V$Z$:PR
INT#J,Y$V$J$B$E$L$A$V$Z$:PRINT#J
,Y$V$L$J$G$V$Z$:PRINT#J,Y$V$M$J$
B$E$V$Z$:PRINT#J,Y$V$V$R$B$P$B$V
$Z$:PRINT#J,Y$V$V$R$B$Q$A$V$Z$
145 PRINT#J,Y$V$V$R$B$R$V$Z$:PRI
NT#J,Y$V$V$Q$C$R$V$Z$:PRINT#J,Y$
V$U$R$H$O$V$Z$:PRINT#J,Y$V$U$S$B
$L$A$L$B$P$V$Z$:FORX=1TO3:GOSUB9
98:NEXT:GOTO1
146 PRINT#J,Y$V$U$A$T$A$T$V$Z$:P
RINT#J,Y$V$T$C$R$B$T$V$Z$:PRINT#
J,Y$V$M$I$H$T$V$Z$:PRINT#J,Y$V$L
$H$L$G$L$A$T$V$Z$:PRINT#J,Y$V$B$
U$R$B$T$V$Z$:PRINT#J,Y$V$A$L$H$I
$T$V$Z$:PRINT#J,Y$V$I$I$U$V$Z$:P
RINT#J,Y$V$H$I$L$U$V$Z$:PRINT#J,
Y$V$C$W$O$V$Z$
147 FORX=1TO2:PRINT#J,Y$V$B$W$P$
V$Z$:NEXT:PRINT#J,Y$V$L$A$U$S$A$
T$V$Z$:PRINT#J,Y$V$M$A$U$Q$B$T$V
$Z$:PRINT#J,Y$V$L$I$I$T$V$Z$:PRI
NT#J,Y$V$I$I$U$V$Z$:PRINT#J,Y$V$
B$W$P$V$Z$:PRINT#J,Y$V$L$A$W$P$V
$Z$:FORX=1TO3:GOSUB998:NEXT:GOTO
1
148 GOSUB1082:PRINT#J,Y$V$F$W$L$
V$Z$:PRINT#J,Y$V$N$F$V$R$V$Z$:PR
INT#J,Y$V$Q$F$U$S$V$Z$:PRINT#J,Y
$V$T$F$V$L$V$Z$:PRINT#J,Y$V$U$M$
F$M$U$V$Z$:PRINT#J,Y$V$V$L$E$U$V
$Z$:PRINT#J,Y$V$U$R$D$T$V$Z$
149 PRINT#J,Y$V$U$T$B$T$V$Z$:PRI
NT#J,Y$V$U$U$A$T$V$Z$:PRINT#J,Y$
V$U$T$A$U$V$Z$:FORX=1TO3:GOSUB99
8:NEXT:GOTO1
150 GOSUB1082:PRINT#J,Y$V$L$E$W$
L$V$Z$:PRINT#J,Y$V$O$E$V$R$V$Z$:
PRINT#J,Y$V$Q$F$U$S$V$Z$:PRINT#J
,Y$V$T$F$V$L$V$Z$:PRINT#J,Y$V$U$
M$F$U$M$V$Z$:PRINT#J,Y$V$U$P$F$T
$V$Z$:PRINT#J,Y$V$M$U$F$M$U$V$Z$
:PRINT#J,Y$V$T$F$V$L$V$Z$:PRINT#
J,Y$V$Q$F$U$S$V$Z$
151 PRINT#J,Y$V$N$F$V$R$V$Z$:PRI
NT#J,Y$V$L$E$W$L$V$Z$:PRINT#J,Y$
V$C$W$O$V$Z$:PRINT#J,Y$V$L$E$W$L
$V$Z$:PRINT#J,Y$V$N$F$V$R$V$Z$:P
RINT#J,Y$V$Q$F$V$O$V$Z$:PRINT#J,
Y$V$T$F$V$L$V$Z$:PRINT#J,Y$V$U$M
$F$U$M$V$Z$
152 PRINT#J,Y$V$U$P$E$U$V$Z$:FOR
X=1TO2:PRINT#J,Y$V$U$T$B$T$V$Z$:
PRINT#J,Y$V$U$U$A$T$V$Z$:PRINT#J
,Y$V$U$T$A$U$V$Z$:FORX=1TO3:GOSU
B998:NEXT:GOTO1
153 PRINT#J,Y$V$L$A$U$O$B$M$U$V$
Z$:PRINT#J,Y$V$A$U$Q$B$L$U$V$Z$:
PRINT#J,Y$V$B$U$P$C$U$V$Z$:PRINT
#J,Y$V$D$U$M$E$T$V$Z$:PRINT#J,Y$
V$M$D$S$D$L$B$T$V$Z$:PRINT#J,Y$V
$O$D$O$D$M$C$T$V$Z$:PRINT#J,Y$V$
Q$G$M$E$T$V$Z$:PRINT#J,Y$V$S$D$M
$F$U$V$Z$
154 PRINT#J,Y$V$Q$D$M$F$M$U$V$Z$
:PRINT#J,Y$V$O$D$M$F$O$U$V$Z$:PR
INT#J,Y$V$M$D$M$F$V$M$V$Z$:PRINT
#J,Y$V$C$M$I$A$V$V$Z$:PRINT#J,Y$
V$B$L$F$P$D$M$U$V$Z$:PRINT#J,Y$V
$B$E$T$D$U$V$Z$:PRINT#J,Y$V$E$U$
N$C$T$V$Z$
155 PRINT#J,Y$V$L$B$U$Q$B$T$V$Z$
:PRINT#J,Y$V$M$A$U$R$A$T$V$Z$:PR
INT#J,Y$V$N$B$U$O$A$U$V$Z$:FORX=
1TO3:GOSUB998:NEXT:GOTO1
156 PRINT#J,Y$V$U$A$T$A$T$V$Z$:P
RINT#J,Y$V$T$C$R$B$T$V$Z$:PRINT#
J,Y$R$B$R$I$H$T$V$Z$:PRINT#J,Y$Q
$B$R$H$L$G$L$A$T$V$Z$:PRINT#J,Y$
P$B$R$B$U$R$B$T$V$Z$:PRINT#J,Y$P
$B$R$A$L$H$I$T$V$Z$:PRINT#J,Y$P$
B$R$I$I$U$V$Z$:PRINT#J,Y$P$B$R$D
$W$N$V$Z$
157 FORX=1TO2:PRINT#J,Y$P$B$R$C$
W$O$V$Z$:NEXT:PRINT#J,Y$P$B$S$B$
U$R$A$T$V$Z$:PRINT#J,Y$P$C$S$B$U
$P$B$T$V$Z$:PRINT#J,Y$Q$J$G$T$V$
Z$:PRINT#J,Y$Q$J$E$B$U$V$Z$:FORX
=1TO3:GOSUB998:NEXT:GOTO1
158 PRINT#J,Y$V$F$W$L$V$Z$:PRINT
#J,Y$V$B$E$S$B$L$B$U$V$Z$:PRINT#
J,Y$V$D$M$B$Q$B$E$T$V$Z$:PRINT#J
,Y$V$F$L$B$O$B$M$C$U$V$Z$:PRINT#
J,Y$V$B$E$L$B$S$C$T$V$Z$:PRINT#J
,Y$V$G$L$B$S$B$T$V$Z$:PRINT#J,Y$
```

```
V$H$L$D$P$B$T$V$Z$:PRINT#J,Y$V$D
$N$C$L$C$P$B$T$V$Z$
159 PRINT#J,Y$V$C$P$C$L$B$P$B$T$
V$Z$:PRINT#J,Y$V$C$P$D$L$B$O$B$T
$V$Z$:PRINT#J,Y$V$D$O$E$L$B$M$C$
T$V$Z$:PRINT#J,Y$V$E$Q$C$L$F$T$V
$Z$:PRINT#J,Y$V$L$E$L$B$N$C$L$E$
T$V$Z$:PRINT#J,Y$V$G$P$C$M$C$T$V
$Z$:PRINT#J,Y$V$B$L$A$L$B$R$B$E$
T$V$Z$
160 FORX=1TO3:GOSUB998:NEXT:GOTO
1
161 FORX=1TO15:GOSUB998:NEXT:GOT
O1
200 GOTO200
998 PRINT#J,Y$V$W$R$V$Z$:RETURN
1000 PRINT#J,Y$W$Q$A$W$P$Z$:RETU
RN
1002 PRINT#J,Y$V$V$C$U$N$V$Z$:RE
TURN
1004 PRINT#J,Y$V$O$J$A$O$V$Z$:RE
TURN
1006 PRINT#J,Y$V$M$I$C$L$I$B$M$V
$Z$:RETURN
1008 PRINT#J,Y$V$L$C$U$U$M$C$L$V
$Z$:RETURN
1010 PRINT#J,Y$V$L$B$L$J$A$L$B$L
$V$Z$:RETURN
1012 PRINT#J,Y$V$L$I$I$G$L$V$Z$:
RETURN
1014 PRINT#J,Y$V$K$V$Z$:RETURN
1016 PRINT#J,Y$V$E$T$C$S$E$V$Z$:
RETURN
1018 PRINT#J,Y$V$C$U$M$A$U$L$C$V
$Z$:RETURN
1020 PRINT#J,Y$V$B$W$N$B$V$Z$:RE
TURN
1022 PRINT#J,Y$V$L$J$G$V$Z$:RETU
RN
1024 PRINT#J,Y$V$P$F$T$E$P$V$Z$:
RETURN
1026 PRINT#J,Y$V$N$I$P$H$N$V$Z$:
RETURN
1028 PRINT#J,Y$V$M$C$Q$C$N$C$P$C
$M$V$Z$:RETURN
1030 PRINT#J,Y$V$L$B$M$F$M$B$L$B
$M$E$M$B$L$V$Z$:RETURN
1032 PRINT#J,Y$V$L$A$L$I$L$A$L$A
$L$H$L$A$L$V$Z$:RETURN
1034 PRINT#J,Y$V$I$D$L$A$L$I$C$V
$Z$:RETURN
1036 PRINT#J,Y$V$E$Q$G$Q$E$V$Z$:
RETURN
1038 PRINT#J,Y$V$C$U$D$U$C$V$Z$:
RETURN
1040 PRINT#J,Y$V$B$U$M$B$M$U$B$V
$Z$:RETURN
1042 PRINT#J,Y$V$B$W$M$C$V$Z$:RE
TURN
1044 PRINT#J,Y$V$C$W$M$B$V$Z$:RE
TURN
1046 PRINT#J,Y$V$C$U$M$B$U$C$V$Z
$:RETURN
1048 PRINT#J,Y$V$M$A$W$L$A$M$V$Z
$:PRINT#J,Y$V$L$B$W$L$B$L$V$Z$:G
OSUB1020:PRINT#J,Y$V$B$U$N$A$U$M
$B$V$Z$:PRINT#J,Y$V$C$U$L$C$U$C$
V$Z$:GOSUB1012:PRINT#J,Y$V$L$I$D
$L$I$C$L$V$Z$:PRINT#J,Y$V$C$W$L$
C$V$Z$:GOSUB1014:GOSUB1012:GOSUB
1012:RETURN
1050 GOSUB1000:GOSUB1002:PRINT#J
,Y$V$P$I$I$P$V$Z$:PRINT#J,Y$V$N$
I$B$L$I$A$N$V$Z$:PRINT#J,Y$V$M$C
$U$U$C$M$V$Z$:PRINT#J,Y$V$L$C$L$
I$I$L$C$L$V$Z$:GOSUB1012:GOSUB10
14:RETURN
1052 PRINT#J,Y$V$V$R$G$L$V$Z$:RE
TURN
1054 PRINT#J,Y$V$W$F$L$V$Z$:RETU
RN
1056 PRINT#J,Y$V$W$L$E$L$V$Z$:RE
TURN
1058 PRINT#J,Y$V$W$M$D$L$V$Z$:RE
TURN
1060 PRINT#J,Y$V$M$A$W$D$V$Z$:RE
TURN
1062 PRINT#J,Y$V$L$B$W$D$V$Z$:RE
TURN
1064 PRINT#J,Y$V$B$W$L$D$V$Z$:RE
TURN
1066 PRINT#J,Y$V$B$U$N$A$U$D$V$Z
$:RETURN
1068 PRINT#J,Y$V$C$U$L$C$S$D$L$V
$Z$:RETURN
1070 PRINT#J,Y$V$W$O$A$M$V$Z$:FO
RX=1TO2:PRINT#J,Y$V$W$O$B$L$V$Z$
:NEXT:PRINT#J,Y$V$W$P$B$V$Z$:PRI
NT#J,Y$V$W$N$D$V$Z$:PRINT#J,Y$V$
W$L$E$L$V$Z$:PRINT#J,Y$V$V$S$B$E
$L$V$Z$:PRINT#J,Y$V$U$U$D$M$D$V$
Z$:PRINT#J,Y$V$U$S$D$M$F$V$Z$:PR
INT#J,Y$V$V$M$D$M$B$E$L$V$Z$
1072 PRINT#J,Y$V$V$D$M$H$L$V$Z$:
PRINT#J,Y$V$U$M$D$M$F$N$C$V$Z$:P
RINT#J,Y$V$U$D$M$F$Q$B$V$Z$:PRIN
T#J,Y$V$S$D$M$F$S$B$V$Z$:PRINT#J
,Y$V$Q$D$M$F$T$B$L$V$Z$:PRINT#J,
Y$V$O$D$M$F$U$L$A$M$V$Z$
1074 PRINT#J,Y$V$M$D$M$F$U$Q$V$Z
$:PRINT#J,Y$V$D$M$F$U$S$V$Z$:PRI
NT#J,Y$V$L$H$U$U$V$Z$:RETURN
1076 FORX=1TO2:PRINT#J,Y$V$J$T$V
$Z$:NEXT:PRINT#J,Y$V$B$L$I$E$L$B
$T$V$Z$:PRINT#J,Y$V$C$U$P$C$T$V$
Z$:PRINT#J,Y$V$L$I$H$U$V$Z$:PRIN
```

```
T#J,Y$V$M$I$B$E$L$U$V$Z$:PRINT#J
,Y$V$T$C$U$S$V$Z$:PRINT#J,Y$V$U$
A$U$T$V$Z$:RETURN
1078 PRINT#J,Y$V$U$A$U$T$V$Z$:PR
INT#J,Y$V$T$C$U$S$V$Z$:PRINT#J,Y
$V$M$I$B$E$U$L$V$Z$:PRINT#J,Y$V$
L$H$L$H$U$V$Z$:PRINT#J,Y$V$C$U$P
$C$T$V$Z$:PRINT#J,Y$V$B$L$I$E$L$
B$T$V$Z$:FORX=1TO2:PRINT#J,Y$V$J
$T$V$Z$:NEXT:RETURN
1080 PRINT#J,Y$V$U$A$T$A$T$V$Z$:
PRINT#J,Y$V$T$C$R$B$T$V$Z$:PRINT
#J,Y$V$M$I$H$T$V$Z$:PRINT#J,Y$V$
L$H$L$G$L$A$T$V$Z$:PRINT#J,Y$V$B
$U$R$B$T$V$Z$:PRINT#J,Y$V$A$L$H$
I$T$V$Z$:PRINT#J,Y$V$I$I$U$V$Z$:
PRINT#J,Y$V$H$I$U$L$V$Z$:RETURN
1082 PRINT#J,Y$V$U$Q$B$M$U$V$Z$:
PRINT#J,Y$V$U$R$B$L$U$V$Z$:PRINT
#J,Y$V$U$R$C$U$V$Z$:PRINT#J,Y$V$
U$Q$E$T$V$Z$:PRINT#J,Y$V$U$O$C$M
$B$T$V$Z$:PRINT#J,Y$V$U$M$D$M$C$
T$V$Z$:PRINT#J,Y$V$U$D$M$E$T$V$Z
$:PRINT#J,Y$V$T$D$M$E$U$V$Z$
1084 PRINT#J,Y$V$R$D$M$E$M$U$V$Z
$:PRINT#J,Y$V$P$D$M$E$V$V$Z$:PRI
NT#J,Y$V$N$D$M$E$V$M$V$Z$:PRINT#
J,Y$V$M$C$M$E$U$S$V$Z$:PRINT#J,Y
$V$C$M$E$U$U$V$Z$:PRINT#J,Y$V$G$
U$M$U$V$Z$:RETURN
2000 PRINT:PRINT" BANNER PRINTER
 BY RAY LIGOCKI":PRINT:PRINT" MA
KE SURE YOUR PRINTER IS ON":PRIN
T" AND PAPER IS SET UP"
2002 PRINT:PRINT" SET UP BAUD RA
TE:":PRINT" 1-300","4-2400":PRIN
T" 2-600","5-4800":PRINT" 3-1200
":PRINT:PRINT" SELECT CHOICE (1-
5)
2004 A$=INKEY$:IFA$="1"THENA=180
ELSEIFA$="2"THENA=87ELSEIFA$="3"
THENA=41ELSEIFA$="4"THENA=18ELSE
IFA$="5"THENA=6ELSE2004
2006 POKE150,A:PRINT:PRINT" (F)U
LL OR (H)ALF LINE FEED
2007 A$=INKEY$:IFA$="F"THENA=54E
LSEIFA$="H"THENA=28ELSE2007
2008 PRINT#-2,CHR$(27);CHR$(A)
2010 PRINT#-2,CHR$(27);CHR$(A)
2012 CLS:PRINT:PRINT" BACKGROUND
 SET-UP:":PRINT:PRINT" DO YOU WA
NT?":PRINT" 1-(:)":PRINT" 2-(<)"
:PRINT" 3-BLANK":PRINT" 4-SPECIA
L CODE":PRINT:PRINT" SELECT (1-4
)
2014 A$=INKEY$:IFA$="1"THENL$=":
"ELSEIFA$="2"THENL$="<"ELSEIFA$=
"3"THENL$=" "ELSEIFA$="4"THENGOS
UB3000:L$=CHR$(ZZ)ELSE2014
2016 CLS:PRINT:PRINT" BORDER SET
-UP":PRINT:PRINT" DO YOU WANT?":
PRINT" 1-(*)":PRINT" 2-(+)":PRIN
T" 3-(#)":PRINT" 4-(%)":PRINT" 5
-BLANK":PRINT" 6-SPECIAL CODE":P
RINT:PRINT" SELECT (1-6)
2018 A$=INKEY$:IFA$="1"THENZ$="*
"ELSEIFA$="2"THENZ$="+"ELSEIFA$=
"3"THENZ$="#"ELSEIFA$="4"THENZ$=
"%"ELSEIFA$="5"THENZ$=" "ELSEIFA
$="6"THENGOSUB3000:Z$=CHR$(ZZ)EL
SE2018
2020 CLS:PRINT:PRINT" CHARACTER
PRINTING":PRINT:PRINT" DO YOU WA
NT?":PRINT" 1-(@)":PRINT" 2-(0)"
:PRINT" 3-BLANK":PRINT" 4-CHARAC
TER'S CHARACTER":PRINT" 5-SPECIA
L CODE":PRINT:PRINT" SELECT (1-5
)
2022 B$=INKEY$:IFB$="1"THENA$="@
"ELSEIFB$="2"THENA$="0"ELSEIFB$=
"3"THENA$=" "ELSEIFB$="4"THENCH=
1ELSEIFB$="5"THENGOSUB3000:A$=CH
R$(ZZ)ELSE2022
2024 CLS:PRINT:PRINT" USE UPPER
& LOWER CASE LETTERS":PRINT" AND
 NUMBERS 0-9 ONLY!!!"
2026 PRINT:PRINT" WHAT IS YOUR M
ESSAGE?":POKE282,0:INPUTAA$:AA$=
AA$+CHR$(123):POKE282,1
2028 J=-2:M$=L$+L$:N$=L$+M$:O$=L
$+N$:P$=L$+O$:Q$=L$+P$:R$=L$+Q$:
S$=L$+R$:T$=L$+S$:U$=Q$+O$:V$=U$
+O$:W$=V$+T$:X$=U$+U$+U$+U$+U$+S
$:Y$="          "+Z$
2030 PRINT#J,Y$+STRING$(59,Z$):F
ORX=1TO9:PRINT#J,Y$X$Z$:NEXT:Z=0
:GOTO1
2032 B$=A$+A$:C$=A$+B$:D$=A$+C$:
E$=A$+D$:F$=A$+E$:G$=B$+F$:H$=A$
+G$:I$=A$+H$:J$=A$+I$+I$:K$=I$+I
$+I$:RETURN
2034 FORX=1TO6:GOSUB998:NEXT:PRI
NT#J,Y$+STRING$(59,Z$):FORX=1TO2
0:SOUND180,1:NEXT:FORX=1TO10:PRI
NT#J:NEXT
2036 PRINT:PRINT" DO YOU WANT AN
OTHER COPY? (Y/N)
2038 XX$=INKEY$:IFXX$="Y"THEN203
0ELSEIFXX$="N"THEN2040ELSE2038
2040 PRINT:PRINT"DO YOU WANT A N
EW BANNER? (Y/N)"
2042 XX$=INKEY$:IFXX$="Y"THENCH=
0:GOTO2012ELSEIFXX$="N"THENENDEL
SE2042
3000 PRINT:PRINT" ENTER ASCII NU
MBER";:INPUTZZ:RETURN
```

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NEW

The DS-69A is the best video digitizer available for your COCO at any price. This new, turbocharged version of our original DS-69 Digisector allows your 64K COCO to see clearly into the world of any television picture.

SPEED!	The fastest — 8 images per second!
PRECISION!	The highest — 64 levels of true grey scale!
RESOLUTION!	The finest — 256 × 256 picture elements!
Compabitibility	Use with a black and white or color camera, a VCR or tuner.
Compactness	Self contained in a plug in Rompack.
Convenience	Use with a Y-cable, Multi-Pak, PBJ Bus or plug directly into the cartridge slot.
Ease of Use	Software on disk will get you up and running fast!

POWERFUL C-SEE™ SOFTWARE

C-SEE is the menu driven software package included with your DS-69A. Available on disk or cassette, it provides lightning fast 5 level digitizing to the screen, high precision 16 level digitizing for superb hard copy printout and simple keyboard or joystick control of brightness and contrast. Or call our driver routines from your own Basic program for easy 64 level random access digitizing. Pictures taken by the DS—69A may be saved on disk or cassette by C-SEE and then edited with COCO MAX, MAGIGRAPH or GRAPHICOM for special effects. Any of the popular printers may be used to obtain printouts of images digitized by the DS-69A.

ONE YEAR WARRANTY

DS-69A Digisector & C-SEE III Software	**$149.95**
OR your DS-69 &	**$ 59.95**
MAGIGRAPH Graphics Editor on disk	**$ 39.95**

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And that's the DS-69A. The DS-69 is The Micro Works' original video digitizer, tried and true since 1984. It provides almost all the features of the DS-69A and is now available at a new low price. The DS-69 features;

SLUGGISHNESS	2 images per second. Quick enough to freeze all but the fastest moving pictures.
IMCOMPATIBILITY	Brightly colored scenes may be striped when using a color camera.
INCONVENIENCE	Will not work with a Y cable.

Otherwise, it's a DS-69A. Precision, resolution, compactness, ease of use, software and warranty. Except one last thing.

DS-69 Digisector & C-SEE III Software	**$ 99.95**

Superb image quality produced by both Digisectors.

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Screen

John Hancock
Screen

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If you are not completely satisfied with the performance of your new DS-69A or DS-69 you may return it, undamaged, within ten days for a full refund of the purchase price. We'll even pay the return shipping. If you can get any of our competitors to give you the same guarantee, buy both and return the one you don't like. We know which one you'll keep.

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The RAINBOWfest Reporter

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Writer: Bruce N. Warner

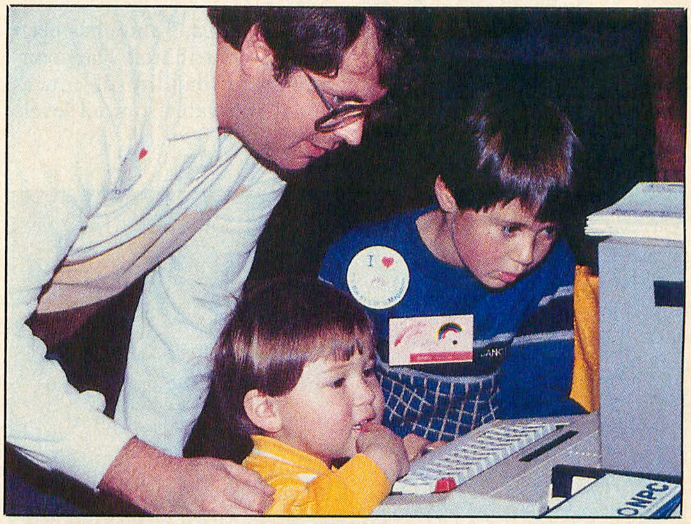
Weather no deterrent to Palo Alto RAINBOWfest

There are any number of things that could have made the Palo Alto RAINBOWfest a failure. There was record-breaking rainfall, mud slides, highways covered with water and a lot more. But you can't stop a CoConut. In spite of the weather, people looked to the sky and saw the rainbows that may have reminded them that RAINBOWfest was alive and well. A good sign in any number of cultures, the rainbow symbolizes the good around us.

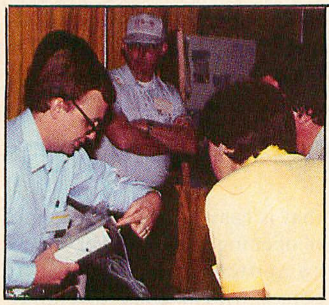
News seems to be the theme of RAINBOWfests and this one was no exception. From 256K RAM cards to the presence of two Users Groups, there was news at RAINBOWfest.

Many booth vendors have asked that their show prices not be mentioned in "The RAINBOWfest Report." Some specials are available because of special bulk purchases and others are offered to draw interest to a specific booth or just as a bonus for participating in the show. There are even instances when a vendor is able to make a special purchase that is carried to the show and is not otherwise available.

It's enough to report that every vendor displayed a new product and/or had at least one discount for the show. The only way to get in on the show specials is to be there! The next RAINBOWfest is in Chicago, May 23-25.



Masa Patterson, 3, of Concord, Calif., seems to have things well in hand as his brother, Willy, 6, and father, Bill, look on.



Richard Alan of J&M gives a quickie tutorial.

J&M — a hard act to follow

The extra power of the new JDOS has caused many CoCo owners to abandon Disk BASIC forever. The newest version is sure to show why many of us are willing to switch to a new DOS even with loss of compatibility.

If you're using your Color Computer under BASIC, you can cure many of the compatibility problems by saving programs in ASCII format, a simple trick many users have forgotten. Add a socket for your Radio Shack ROM, and you're on your way to a super system.

But that's not the best news. J&M was delighted to show its new hard drive, which boots OS-9 directly. It's the only hard disk for the Color Computer that doesn't even require a floppy disk to boot up OS-9, all directly from the J&M controller.

In addition to CoCo owners, Tandy portable and MS-DOS users attend the concurrent PCMfest, sponsored by RAINBOW's sister magazine PCM.

Something to hoot about at the Owl-Ware booth

Owl-Ware offers a true hard disk under both OS-9 and Disk BASIC. They do it by requiring both the LR Tech hard drive interface and the DISTO Super Controller. With these two items and a customized 27128 EPROM (configured separately for each system), the Color Computer accesses a hard drive as drives 4 through 9. These "drives" are directly addressable from OS-9 in their "DRIVEn" directories. This may prove to be the perfect mating of both systems!

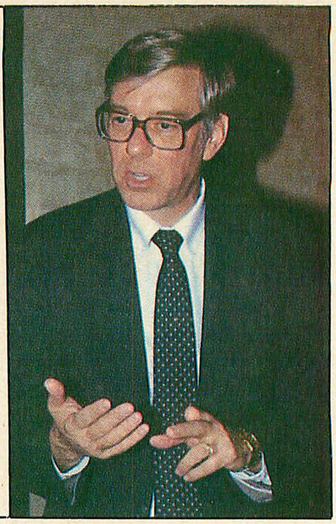
Education and computers are theme for CoCo Community Breakfast

Among those at the head table, Janet and Bill Barden.

William D. Gattis, vice president of Tandy's Education Division, was the guest speaker at the CoCo Community Breakfast. Gattis spoke on "Computers in Education: The Next Five Years."

In this area, Tandy has been a major contributor. Their continuing availability of educational software from all levels (from preschool through graduate level) makes Tandy a leader in this area.

The CoCo Community Breakfast offers both Color Computer and MS-DOS computer enthusiasts an opportunity for fellowship and a chance to make new friends with similar interests in a congenial setting.



Breakfast keynoter William D. Gattis.

Saturday morning's traditional CoCo Community Breakfast is hosted by RAINBOW's Lonnie Falk.

Rosen does it again

Bob Rosen of Spectrum Projects was wheeling and dealing in his usual style at Palo Alto. He was making the deals and showing the things that make RAINBOWfest a success.

In addition to the Spectrum *Thunder RAM*, Bob was running specials on the DISTO Super Controller, designed by "Turn of the Screw" guru Tony DiStefano. This is the same Super Controller that can have its own built-in 80-column card, parallel printer port and real-time clock. All for the cost of an 80-column card alone.

Rounding out the Rosen collection was *Telepatch*, a set of enhancements for *Telewriter-64* that gives the user true block movement, overstrike, spooling and type-ahead buffer plus faster disk I/O.

The big Spectrum Projects deal of the weekend was the 64K CoCo for just $64! A deal by any other name is just a deal, but $64 64K CoCos are beyond the dreams of mere mortals.

OS-9 Users Group Breakfast draws several speakers

The OS-9 Users Group Breakfast was opened by OS-9 Users Group president Brian A. Lantz. He set the theme as one of friendship and openness.

Wayne Day of CompuServe spoke on his additional new post as the SysOp of the OS-9 SIG (Special Interest Group) on CompuServe. Wayne is also SysOp of the CoCo SIG.

Bruce Warner, editor of *MOTD* (UG's monthly newsletter), made a pitch for input from writers.

The last speaker, Paul Searby, president of Computerware, spoke of what needs to be done to make OS-9 an even better operating system, including better new-user documentation, more software and less comparison to UNIX.

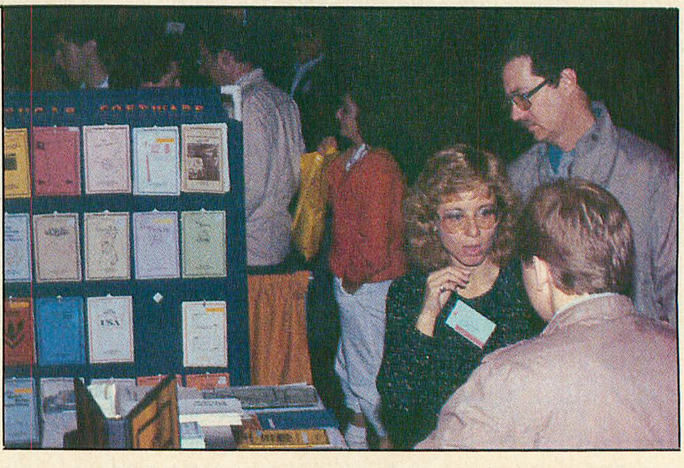
One of Paul's more striking comments was about the need for a programming language to be included with OS-9 — one that is easy to use and capable of opening its true power to new computer users. Because it comes with a good assembler and a simple editor is not enough to make it the operating system of the future. He feels OS-9 must be made more understandable if it is to survive.

Something sweet from Sugar Software

Sugar Software's Susan Davis has always been noted for showing how women can be a vital part of the Color Computer industry. At the Palo Alto show she lived up to and surpassed her reputation.

CoCo Knitter was the hit of the show for Sugar Software. Here's a program that asks for the measurements, plans the pattern and gives all the information needed to knit a perfect sweater, including the pattern and amount of yarn.

Susan informed us she was advised against the practicality of *CoCo Knitter*, but this program proves that you can't argue with success!

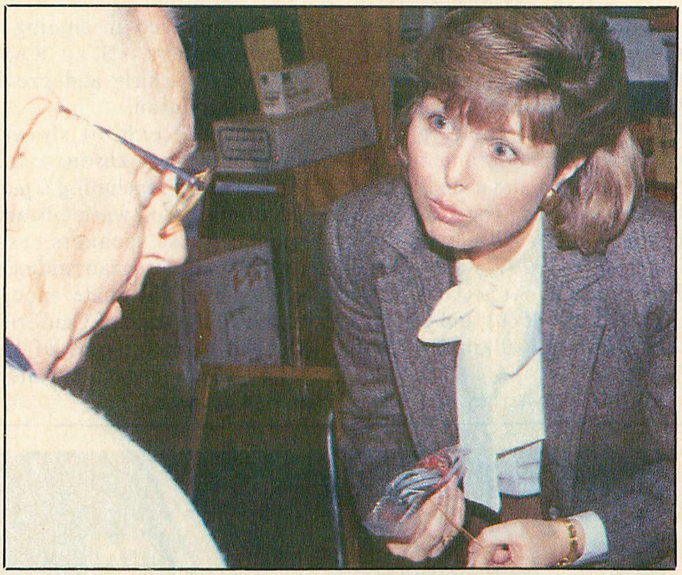


Susan Davis with a colorful array of packaged programs in her Sugar Software booth.

Computerware is everywhere!

Sue and Paul Searby of Computerware were on hand for every major function of the Palo Alto RAINBOWfest, including Paul's presence as the guest speaker at the first OS-9 Community Breakfast.

Computerware offered a variety of Color Computer software and hardware and showed that they will continue to be a leader in the Radio Shack market. Compared to the price of comparable MS-DOS software, Computerware was practically giving theirs away.



Sue Searby responds to a visitor at Computerware's exhibit.

MichTron displays new games

Gordon Monnier of MichTron Software was eager to introduce their new products at Palo Alto. And he has good reasons to show off *Rommel 3-D* and *Pin Ball Factory.*

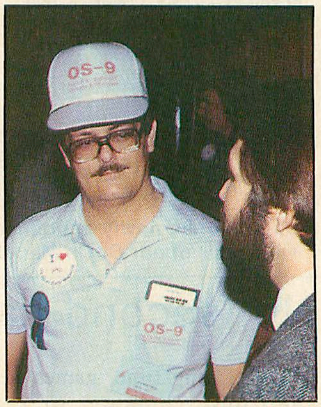
MichTron is developing a name for inexpensive, quality, high resolution games for the Color Computer. If *Rommel 3-D* and *Pin Ball Factory* are any indication of what we can expect in the future, we're in for the time of our lives.

Radio Shack cleared the warehouse

The Radio Shack booth had some of the best deals in town, including Tandy's DT100 terminals for $125!

It was rumored that some people obtained entire pocket computer systems for less than $40, including software and cassette systems. Add to that the offering of software at 60 percent and more off the suggested retail price, and the Radio Shack booth may have had *the* deals of the show.

A flea-market atmosphere pervades the local Radio Shack's center-aisle space as both hardware and software are greatly discounted.



Brian Lantz, president of the OS-9 Users Group.

OS-9 gurus: man your booth!

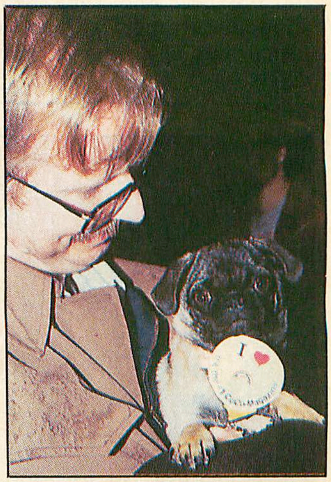
Something new came to Palo Alto. They came with built-in multitasking, they were multi-users and they were all booted up! The OS-9 Users Group manned the booth directly across from the Falsoft booth.

Throughout the weekend, newcomers to the OS-9 Community came by the booth to learn all about OS-9, BASIC09, procedure/script files and a lot more. With such people as Brian Lantz, Bill Turner, Steve Odneal, Dale Puckett, Jim Kemp and Bruce Warner on hand to field questions, there wasn't one that couldn't be answered.

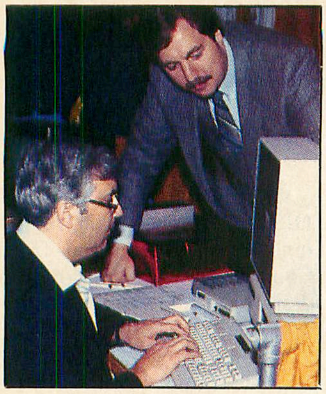
DISTO or CRC? This is the question

One of the busiest booths was DISTO's, a new Color Computer third-party vendor from Canada. They feature products designed by RAINBOW Contributing Editor Tony DiStefano. Their best known product is the DISTO Super Controller, a disk controller for the Color Computer that supports up to four software selectable DOSs and has its own expansion bus inside the controller, which supports their set of peripheral equipment and adapters.

The only problem DISTO had at the show was having enough products. By Sunday morning they had gone through all of their Display80 cards (an 80-column display with parallel printer port and real-time clock that all fits inside the DISTO Super Controller at once), most of their MPROM programmers (an expansion device to program 2764 and 27128 EPROMs also used inside DISTO Super Controller) and almost all of their Super Controllers. After selling down to the bone, they decided to liven things up by announcing that they would give away a Super Controller to the first person to bring a copy of their ad from the March 1986 RAINBOW magazine.



Will Murray of Sacramento brought his pug, Kaiana. Will reads both RAINBOW and PCM, so the combined show is made to order for him.



Delphi's John Gibney (at keyboard) and Bryan Eggers, president of Software Affair, online at RAINBOWfest.

Local users represented by California Computer Federation

A local users group usually takes a booth at RAINBOWfest, and in Palo Alto it was the California Computer Federation (CCF). Their group spreads from Sacramento to San Francisco and even farther to Los Angeles. The CCF has contacts in Los Angeles (Harry Tischler 818-997-6000), San Francisco Bay Area (Dick Stanich 415-366-4560) and Sacramento (Mike Faulkin 916-753-7354).

At the show, they were actively involved in signing up new members, selling RAINBOWfest T-shirts and providing information.

The CCF exhibit showed some of the best reasons to join a users group, including a public domain software library, special guest speakers, user tutorials and programming lessons. Those fortunate enough to live in the state of California should contact one of the CCF representatives mentioned above.

Microcom offers a wide variety of CoCo products

Programs at the Microcom booth included all-time favorites such as *DynaCalc*, *Telewriter-64* and the *Best of CoCo Time '85*, a package of the best-selected utilities from *CoCo Time*, their monthly magazine produced on tape and disk. They also had informative books available for the CoCo user. *500 Pokes, Peeks 'N' Execs for the Color Computer*, *Utility Routines* and *BASIC Programming Tricks* were among the wide array of offerings.

Hard Drive Specialists parade Tandy 1000 accessories

The folks from Hard Drive Specialists came ready to strut their stuff. Their major promotion for the show was their Tandy 1000 line, but they continue to show the CoCo HDS disk controller complete with disk drives.

The HDS controller now supports both 2764 and 27128 EPROMs in the 28-pin socket as well as the 24-pin standard socket. The nicest thing about having two ROMs is switching from an enhanced 16K ROM on an inexpensive 28-pin EPROM to standard Radio Shack Disk BASIC (1.0 or 1.1) in the 24-pin socket.

HDS was busy showing their Tandy 1000 internal/external hard drive, and they even showed one model with an external and two internal hard drives.

John Monin, newly-appointed president of Colorware, is "pleased with sales of our *CoCo Max II*."

Colorware maintains their pretty picture

Colorware, Inc. was again showing how great their *CoCo Max II* program is. It rivals virtually all other graphics programs currently on the market. With *CoCo Max II*, you can draw a picture, fix errors, save any part or all of it and you can almost do without the manual.

Colorware's big product for 1985, enhanced with more features in *CoCo Max II*, may prove to be the product of the year for 1986.

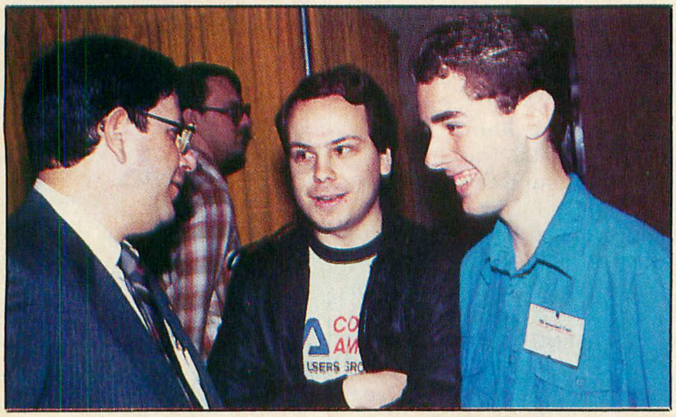
No "second-hand" games from Diecom Products

For a long time, games for the Color Computer were a rehash of what came out for the Atari. From *Space Invaders* to *Donkey Kong*, you could play Atari games using the CoCo. Today things are different.

Diecom Products is proving that the imagination cannot be limited. With Diecom there are no rehashings of old programs, but new software, from *Marble Maze* to the newest in their line, *Paper Route*.

Watching the paper boy deliver papers from his bicycle while evading potholes, oncoming cars, pedestrians and cracks in the sidewalks can hold your attention for hours.

If you're looking for a fun game that gets away from the OK Corral shootouts, Diecom Products has the answer.

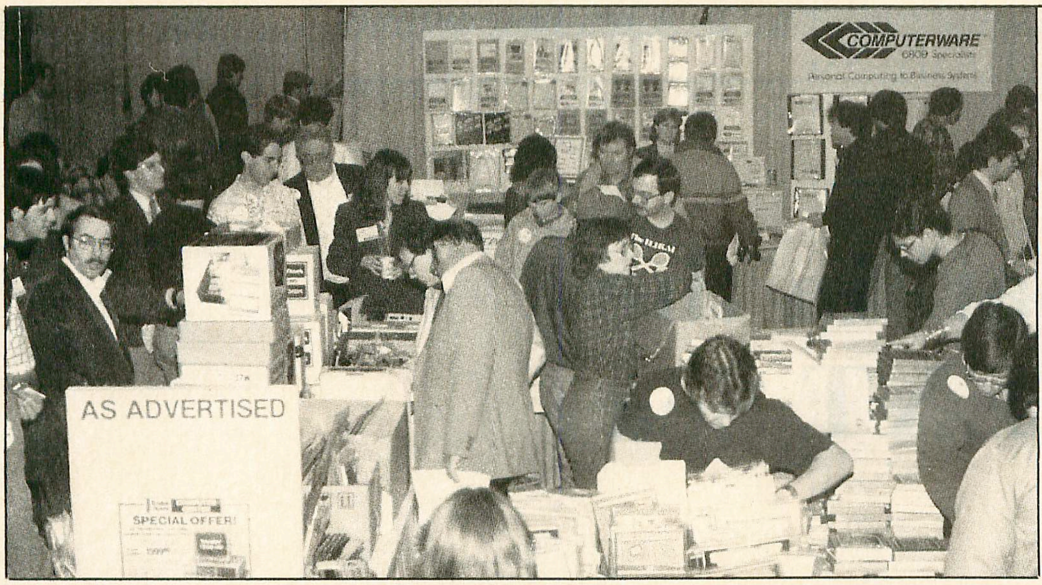


RAINBOW editor and publisher Lonnie Falk discusses bringing the show back to the Los Angeles area with Color America's Mark Randall (center) and Steve Hartford (right).

Spectro Systems shows off ADOS

Art Flexser was kept busy demonstrating ADOS, the enhanced EPROMable Disk Extended BASIC, compatible with virtually 100 percent of Color Computer software. When the crowd wasn't canvassing the hardware, they were checking out some of the software offerings like *The Peeper*, a machine language program tracer that multitasks with target programs, or *Fastape*, a cassette utility that allows double-speed tape operation.

Professor Art Flexser, owner of Spectro Systems and author of ADOS, is also an experimental psychologist specializing in human memory at Florida International University in Miami.



Despite the heaviest rains in years in the Bay area, more than 7,300 people follow the rainbow to our Palo Alto show.

Moreton Bay Software offers special on printers

Moreton Bay Software continues to provide both software and hardware for Color Computer users. Although there wasn't anything new at the booth, their solid line of products would be hard to add to.

Moreton Bay offers everything from video interfaces and built-in sound for the CoCo to unadvertised backup power supplies that keep RAM intact when the power goes out.

Their big offer was a new deal on Okimate 20 printers for $220 with a Color Computer screen dump program.

Cross-country trek rewarding for Derringer Software

California was a short jaunt for many of the vendors, but for Derringer Software it was a trip across the country.

Dennis Derringer was busy all weekend showing off his new and old products. From *Pro-Color-File* to *@Summary*, Dennis continues to provide the Color Computer Community with excellent software. Dennis feels that software should be released only when it is able to stand on its own, without errors, and do what it's advertised to do. For *Pro-Color-File*, that has meant that the only changes made were to allow it to read *DynaCalc* files. It remains one of the best database programs available under Disk BASIC.

The *@Summary* program is a great addition to *DynaCalc*. With it you can read a column of figures and develop a summary of expenditures based on any key entry. You can finish the year by having the Disk BASIC or OS-9 *DynaCalc* files dump out expenditures in chronological order. Using *@Summary*, you can have them summarized in almost any order.

Prickly-Pear displays new Adventure games

Joanne and Mike Chintis were adventurous in the Prickly-Pear booth — they had new Adventure fantasies on display.

Warp Factor X, *Hall of the King* and *Dragon Blade* are the new fast-paced games from Prickly-Pear. All three are designed to keep you on the edge of your seat, trying to stay alive through the next turn of the Adventure. If you should live through the *Hall of the King*, the Adventure continues with *Hall of the King II (The Inner Chamber)*.

Saguaro Software as exciting as ever

Saguaro Software was proudly showing off their *Fighter Pilot* and *Pumpman* programs. Both are fast action, high resolution games for children of all ages, including us 30-plus kids.

When Saguaro Software went into their post-Christmas, low-profile mode, it was rumored that they had gone out of business. But, they are very much alive and well, with some of the best games available for the Color Computer.

Step right up and have your fortune read

LS Systems' *The Gypsy* was busy showing how the Color Computer can be used in business. For LS Systems, it's a matter of using the Color Computer to entertain people at carnivals. They selected the Color Computer for the same reason most of us did. There's one virtually everywhere.

The representatives in the LS booth made no claim that *The Gypsy* could actually tell your fortune, but it is used to attract attention and entertain passers-by at carnivals and circuses.

Southwestern Digital displays quality hardware

Presenting an assortment of quality hardware products, Southwestern showed off the Keytronics Keyboard, an alternative keyboard for the CoCo. They also featured memory expanders and disk drives.

***CoCo Max* author Tim Jenison has customized a TDP-100 (a CoCo-clone, which Tandy no longer markets) by adding both a disk drive and black and white TV *inside the case*!**

The Delphi Affair — Jav and Sassy

Javier Henderson and his bride, Sylvia, met on Delphi. He was calling from Buenos Aires, Argentina, she from Alta Loma, Calif. That was last July. By September, the digital dialogue gave way to weekly voice calls from Argentina. They exchanged pictures. In November and December, it seemed they were always online.

Sylvia (whose username is SASSY) is an electronics engineer at General Dynamics, and Javier (JAV) is an electronics technician, but the telecommunications lines fairly crackled with amorous, not technical, interchange.

December 7, Jav arrived in the U.S. and a week later they were married in Las Vegas at the Candlelight Chapel. Look for the newlyweds online.

PSET Sail in the FOR/NEXT Sea

By Joseph Kolar
Rainbow Contributing Editor

Today's agenda concerns the `PSET` statement and `FOR/NEXT` loops — lots of them! It will be helpful to review the hot scoop and get an overview of `PSET` and `FOR/NEXT` from your favorite manual.

The idea for this tutorial sprang from attempting to convert a "brand X" computer's BASIC into CoCo's vernacular. The plan was to create on a Hi-Res screen, in glorious color, a diagonal line using `PSET` and `FOR/NEXT` loops to add each box (pixel) to give the illusion of movement. The line was to begin in the upper left-hand corner at (0,0) coordinates — at a horizontal location of zero and a vertical location of zero. It would head toward the lower right-hand corner. A straight diagonal line would end at (191,191).

Key in lines 10-50 from Listing 1. Line 30, `PSET(X,Y,Z)`, tells CoCo that we want a small box lit up on the graphics screen at a horizontal location, 'X', a vertical location, 'Y', and in color 'Z'. In this listing, the unnamed color 'Z' is '0'. As a point of information, '0', '4' and '8' will generate the same color on whichever `SCREEN 0` or `1` that is used.

Florida-based Joseph Kolar is a veteran writer and programmer and specializes in introducing beginners to the powers of CoCo.

Line 20, `FOR X=0 TO 191`, and Line 50, `NEXT X`, tell CoCo to light up each horizontal location from zero to 191 in sequence and add them to the display. In order to make the boxes run diagonally, Line 40 demands that CoCo drop down one space on the 'Y' axis, Y=Y+1, each time so the boxes give the appearance of racing pell-mell down the screen.

In my mind's eye, I visualize the `FOR/NEXT` loop as a set of brackets that tell CoCo how many times the program lines within the brackets should be repeated. To see this in action, temporarily add `51 GOTO 51` and run.

The instructions light, in succession, blocks (0,0), (1,1), (2,2), all the way through to (191,191) in color Z=0, or '4' or '8', which is orange.

Naturally, when I examined this diagonal line, I had no idea it would end up in the form it did, much less that it would become a subject for a tutorial.

Its purpose is to inspire you to think creatively! Every beginner is urged to let the creative juices bubble. You should ask yourself, "Now what? What can I do to alter this program? Can I improve it? Enlarge it? Make it more interesting?" You get the drift. There is no such thing as a program that can't be modified, expanded or improved to suit the whims of the person at the keyboard.

Getting back to our loops, my mind's eye saw the line bounce off the bottom wall to the right in a continuation of the action thus far generated. Now type `DEL51` and key in lines 60-90. Lines 61 and 71 are masked for the present. They will be unveiled and explained in due course. The colored line that rests at the bottom, 'Y', will be redirected upward, one step at a time: Y=191, Y=190, Y=189. At the same time the horizontal component, 'X', will move to the right one space at a time: X=191, X=192, X=193. Thus, the action will be (192,190), (193,189), etc.

It is not important to know the location of every succeeding set of `PSET` coordinates. All we demand is that the action advances as envisioned.

Add a temporary `91 GOTO 91` and run. The speeding line goes berserk when it reaches the wall at horizontal 255. It can't go any farther in that direction, and since it has possible vertical values to use up (Y), CoCo now uses the instructions X=255 and Y=Y-1. It continues on an upward, vertical course until (255,0), where Y=0 and then flips its cork when it gets to Line 1002 (go ahead and peek!), where Y=-1 is requested. It can't do it so there is an FC Error in 1004.

Suppose you wanted to find out what the 'Y' value was when the line hit the right wall on the screen. Here is one way, add:

```
72 IF X=255 THEN CLS:PRINT
Y:GOTO10000 10000 GOTO 10000.
```

Line 72 tells CoCo that if X=255 is to clear the screen to the text screen so it can print 'Y', it needs to bypass the program to hold the value on the screen at Line 10000.

Copy Line 72 down if you want to recall the routine format for later use. Type in `DEL72` and leave Line 10000 alone. It is harmless and we will need it later.

Obviously, we want to continue bouncing our line off the wall, so `DEL91` and unmask (remove the `REM` marker) Line 71. Now type in `EDIT71` to 'D' and press ENTER. We ask CoCo in a nice way to go to Line 1000 when X=255 for further instructions.

Key in lines 1000-1006. Now we reverse directions. Note that in a `FOR/NEXT` loop, when we go from a lower number to a higher value one step at a time, STEP1 is the default mode. If you do not add it at the end of the `FOR` line, CoCo assumes you want to go in increments of one. When you go from a higher number to a lower value, the STEP-X, where 'X' is the desired value, must be included in the `FOR` line so CoCo won't get cranky and knows exactly what your desires are.

Can you figure out from looking at lines 1000 and 1002 in which direction we are heading? Key in `1007 GOTO 1007` and run. Now you know for sure! We ran into the top wall and must veer away.

If you want to find out the value of 'X', use the routine you copied down. (Make sure you reverse the values, 'X' for 'Y' and 'Y' for 'X').

To continue our mad journey, type in `DEL1007` and press ENTER. Since CoCo blew its fuse again, unmask Line 1001. This line tells CoCo, "OK, since Y=0, go on to Line 2000 for further instructions." Key in lines 2000 to 2006 and run. This time we caused poor CoCo to crash into the left wall (X=0). As you suspected, unmask Line 2001. Again, we tell CoCo, "You hit the wall, so go to Line 3000 to continue."

Key in lines 3000-3006 and run. We are going to go in the same direction as in the second leg of the moving line (the routine for which begins at Line 60). Unmask Line 3001 and tell CoCo to go back and follow that routine one more time. We might as well get double duty from the routine, so run it again.

This segment gets us up into the corner but it reverses direction, heads in the opposite direction and eventually bombs out. This is because Line 71 says `X=255 GOTO 1000`. But, we have other plans — unmask Line 61. At a program line number that comes before Line 71 we can tell CoCo that if the running line gets into the upper right-hand corner of the screen (255,0), to go instead to Line 4000 for new instructions.

Can you figure out the next plan of attack? Certainly! Put a border around the screen, using the running line to continue the mad dash onward.

Key in lines 4000-7006. If you want to see each segment of the border as it is created, put temporary hold lines at 4007, 5007 and 6007 and run. Delete each one in turn and run.

All four routines beginning at lines 4000, 5000, 6000 and 7000 are somewhat similar. Study the listing to see how we told CoCo in which direction to travel. Note that in this group of routines, you could have put the 'X' value in lines in the 4000 and 6000 series and the 'Y' values in the 5000 and 7000 series, in place of the 'X' or 'Y' value in the appropriate `PSET` line. For instance:

From	**To**
`4002 X=255`	`4002` (line deleted)
`4004 PSET (X,Y,Z)`	`4004 PSET (255,Y,Z)`

Type in `DEL4002` and press ENTER, then `EDIT4004` and press the space bar to move the cursor under 'X', press 'D' to take out '1', and 'I' to get into insert mode. Type `255` and press ENTER to get out of edit.

If you don't want to bother with this last modification, you must have noted that there are an awful lot of identical `PSET` lines in the listing. Why not put them into a `GOSUB` routine and call them with a `GOSUB`? You can do it for practice if you wish, however, it has no practical advantage because the `PSET` lines are easy to key in and not much memory is saved by replacing `PSET(X,Y,Z)` with `GOSUB9000`, plus the fact that the `GOSUB` itself must be created. Key in `9000 PSET(X.Y.Z):RETURN`.

Such are the musings of the master. Do it for practice to give yourself valuable confidence and familiarity with the raw material of BASIC.

Now run the program. What else can we do? It looks like we lucked into a well-balanced, self-contained design. I wouldn't care to disturb it. But wait! Now that we created it, why not erase it, recreate it, wipe it out, ad infinitum?

Key in lines 8000-8001 and unmask both of them. A continuous loop is created so that if Z=1 (the blank-out color), then `GOTO` Line 8001, where the color is changed to the "put-on" color and returned to Line 20, to make a visible line. Otherwise, if Z=0 (put-on color), then change it to Z=1 and go back and erase the line by making an invisible line. If you changed Z=1 to Z=5 in Line 8000 and Z=0 to Z=8 in Line 8001, you would still get the same colors.

We could have used the `LINE` statement to create the border, but we would have lost the action. For practice, create the border using the `LINE` statement. After you solve that problem, use `DRAW` to do it one more way. The suggested answer is at the end of this tutorial.

The point of this tutorial, with its repetitive routines, is to get you immersed in a sea of `FOR/NEXT` loops that use the `PSET` statement as its moving force. You are encouraged to improve, modify and alter this program in any manner you can conceive. You owe it to yourself to practice, and while you are hammering away at the keyboard, remember, "everyday, in every way, I am learning a little bit more and I feel good about my CoCo."

CoCo enjoyed your key-tickling endeavors and I hope you enjoyed this tutorial.

To alter the border:

```
DEL4000-7006
4000 LINE(255,191),PSET:LINE-
(0,191),PSET:LINE-(0,0),PSET
:LINE-(255,0),PSET
4000 DRAW''C4BM255,0D191L
255U191R255"
```

This gives a variation of a theme. ☐

Listing 1: LINE

```
0 '<LISTING1>
10 PMODE3,1:PCLS:SCREEN1,1
20 FOR X=0 TO 191
30 PSET(X,Y,Z)
40 Y=Y+1
50 NEXT X
60 FOR Y=191 TO 0 STEP-1
61 'IF X=255 AND Y=0 GOTO4000
70 PSET(X,Y,Z)
71 'IF X=255 GOTO1000
80 X=X+1
90 NEXT Y
1000 FOR X=255 TO 1 STEP-1
1001 'IF Y=0 GOTO2000
1002 Y=Y-1
1004 PSET(X,Y,Z)
1006 NEXT X
2000 FOR Y=0 TO 191
2001 'IF X=0 THEN GOTO3000
2002 X=X-1
2004 PSET (X,Y,Z)
2006 NEXT Y
3000 FOR X=0 TO 255
3001 'IF Y=191 GOTO 60
3002 Y=Y+1
3004 PSET(X,Y,Z)
3006 NEXTX
4000 FOR Y=0 TO 191
4002 X=255
4004 PSET(X,Y,Z)
4006 NEXT Y
5000 FOR X=255 TO 0 STEP-1
5002 Y=191
5004 PSET(X,Y,Z)
5006 NEXTX
6000 FOR Y=191 TO 0 STEP-1
6002 X=0
6004 PSET(X,Y,Z)
6006 NEXT Y
7000 FOR X=0 TO 255
7002 Y=0
7004 PSET(X,Y,Z)
7006 NEXTX
8000 'IF Z=1 THEN GOTO8001 ELSE
Z=1:GOTO20
8001 'Z=0:GOTO20
```

Listing 2: HEART

```
0 '<HEART>
5 PCLS
30 PMODE4,1
40 A=128:B=90:R=80:PI=3.14
50 DIM S(13)
60 DRAW"BM6,2L3GD3F8E8U3HL3G4H4"
70 GET(0,0)-(20,24),S,G
80 PCLS
170 SCREEN1,1
175 FOR S=21 TO 21 STEP21
180 FORZ=1TO337 STEPS:C=Z
190 C=90+C*PI/180
200 X=INT(A-6+R*COS(C)):Y=INT(B-
8+R*SIN(C))
210 PUT(X-40,Y+4)-(X-20,Y+20),S,
PSET
211 PUT(X+30,Y+4)-(X+50,Y+20),S,
PSET
212 GOTO290
220 NEXT Z,S:PLAY"V20L2C":PCLS:F
OR Z=1 TO 1000:NEXT:GOTO700
290 D=RND(10): ON D GOTO300,310,
320,330,340,350,360,370,380,390
300 PLAY"V20L4CCL8C":GOTO500
310 PLAY"V30L8EEL16GG":GOTO220
320 PLAY"V25L16BBFD":GOTO220
330 PLAY"V15L4EFG":GOTO220
340 PLAY"V25L8FL16FAL8F":GOTO600
350 PLAY"V20L4CL8EE":GOTO500
360 PLAY"V25L16GGBBGG":GOTO620
370 PLAY"V30L8EL16GGL8E":GOTO390
380 PLAY"V20L4CL8DL16EE"
390 PLAY"V20L8DL4O1BO2C"
500 V=RND(3): ON X GOTO 510,520,
530
510 PLAY"V20L16FFL8EE":GOTO610
520 PLAY"V30L16GGL8E":GOTO620
530 PLAY"V25L16EEL8CD:GOTO390
600 V=RND(3): ON V GOTO610,620,6
30
610 PLAY"V25L8ECC":GOTO220
620 PLAY"V25L8DED":GOTO390
630 PLAY"V25L8BO3CO2B":GOTO390
700 DRAW"S40BM84,32L3GD3F8E8U3HL
3M-4,+3M-4,-3"
705 PAINT(128,96),1,1
710 GOTO170
```

Hint . . .

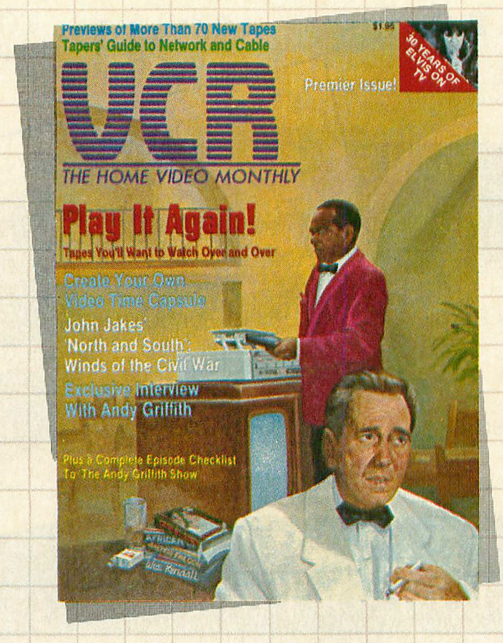
Don't Be Fooled By Those Error Messages

Many of our readers have written to us saying the computer tells them there is an error in a line that has been entered correctly. This is usually caused by errors in a related line. For instance, an illegal function call (FC) error is almost always caused by an incorrect variable definition *elsewhere* in the listing. Also, if a line containing a READ statement is typed in wrong, you will get a syntax (SN error in the DATA statement line number — even though you typed it exactly as it appeared. Remember, be patient and thorough when debugging.

The publishers of the Rainbow are taking an interest in a different type of programming

VCR

THE HOME VIDEO MONTHLY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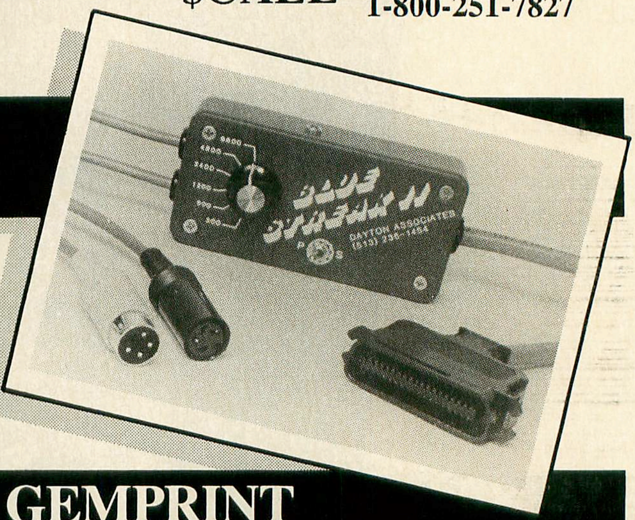

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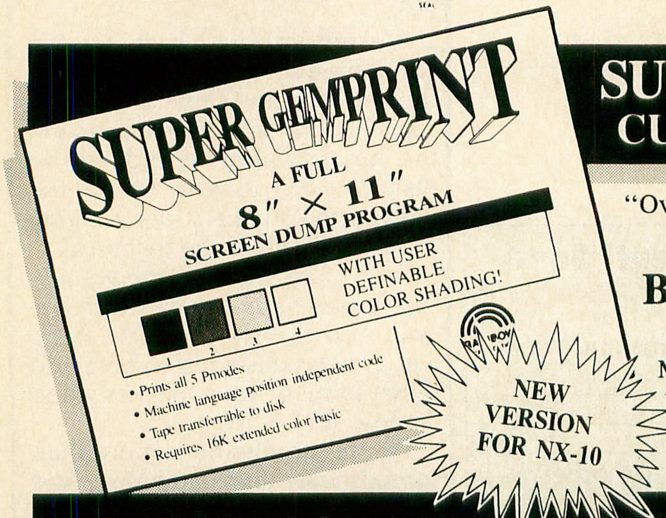

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RECEIVED & CERTIFIED

The following products have recently been received by THE RAINBOW, examined by our magazine staff and approved for the *Rainbow Seal of Certification*, your assurance that we have seen the product and have ascertained that it is what it purports to be.

This month the *Seal of Certification* has been issued to:

Alphabetizing, an educational program requiring a disk drive that uses graphics to teach the concepts of alphabetizing, including missing letters, letters before/after, alphabetizing words with pictures, by first letter and from second to sixth letter. Comes on two disks with a management system, teacher's guide and a backup copy. *Aquarius People Materials, Inc., P.O. Box 128, Indian Rocks Beach, FL 33535, disks $69*

The BASIC Advanced Programming Aid, a 16/32/64K program to integrate the most-used utility functions and save disk space and time, because programs do not have to be stored in ASCII format. Features include a copy command to copy one or more statements in a program, a move command to move one or more statements, a find command to find a string and repeat it, and Multiple Editing Sessions allowing users to edit two programs at once and `MERGE` all or part into one program as well as run a program while editing another. There are scrolling, command keys, repeating keys, automatic line numbering, BASIC formatting, keyboard clicker, CLEAR key disable and automatic program exit. *Bangert Software Systems, P.O. Box 21056, Indianapolis, IN 46221, cassette or disk $24.95, plus $2 S/H*

Super Programming Aid, a 16/32/64K program containing all the features of *The BASIC Advanced Programming Aid* plus programmable command keys allowing users to program any key to cause up to 250 characters to be entered. *Bangert Software Systems, P.O. Box 21056, Indianapolis, IN 46221, cassette or disk $24.95 plus $2 S/H*

Zork I, a 64K Adventure game for the Color Computer 2 requiring a disk drive. This interactive fiction game has four levels, from introductory to expert, and places you in the role of explorer, who delves the vast underground world of Zork for incomparable treasures and matches wits with outlandish creatures. *Infocom, 125 Cambridge Park Drive, Cambridge, MA 02140, disk $34.95*

Wishbringer, a 64K Adventure game for the Color Computer 2 requiring a disk drive. This interactive fiction story places you in the role of post office worker, who in the performance of duties, becomes entailed in a fantastic quest. Traveling through strange and savage zones, you carry the heart of a wronged princess who died unfulfilled; her heart has become a magic stone and her vindication rests on your skill and wits. *Infocom, 125 Cambridge Park Drive, Cambridge, MA 02140, disk $34.95*

The Witness, a 64K Adventure game for the Color Computer 2 requiring a disk drive. The scenario places you in the role of Chief Detective for a quiet burgh on the outskirts of L.A. One high-society dame is dead, and blackmail and shakedowns abound. You face a Gordian knot of motives and alibis and a race against the clock to nail the killer before you get nailed first. *Infocom, 125 Cambridge Park Drive, Cambridge, MA 02140, disk $34.95*

Portraits of Christ: As Painted in John's Gospel, two disks requiring 64K and a word processing program capable of reading ASCII text files and having a storage buffer of at least 20K. This is a manuscript on disk that covers 21 aspects of the life and work of Christ as portrayed in John's Gospel. *Sovereign Grace Software, 221 Highview Drive, Ballwin, MO 63011, disk $16.95 plus $1 S/H*

An Introduction to the Doctrines of Grace, a 64K disk that contains a basic introduction to the doctrine of God's sovereignty in electing grace. *Sovereign Grace Software, 221 Highview Drive, Ballwin, MO 63011, disk $10.95 plus $1 S/H*

Miscellaneous Writings, a 64K disk containing 13 files of articles, tracts and sermon notes. *Sovereign Grace Software, 221 Highview Drive, Ballwin, MO 63011, disk $10.95 plus $1 S/H*

Snap Study System, a 32K home utility requiring a disk drive that functions as an outliner to simplify keeping records, plans, summaries, checklists, agendas, references and notes. Features include ease of revision, addition, deletion, print and no necessity for filenames. *Cozy Software, 25142-53 Avenue, Aldergrove, British Columbia, Canada V0X 1A0, disk $19.95 plus $2 S/H*

U.S. Stamp Inventory Management System, a 64K program for the Color Computer 2 requiring a disk drive. This program for philatelists supports all U.S. stamp categories, allows addition, deletion and editing of inventory, inventory display and printouts, update of inventory retail values, flexible inventory value computations, insertion of items in proper inventory sequence and identification of items by Scott catalog numbers. *Crockett Software, P.O. Box 1221, St. Ann, MO 63074, cassette $44.95*

Mailing List/Data Information, a 16/32/64K program for the Color Computer 2. This is a business and/or home utility that features support of five- or nine-digit ZIP codes, sorts performed on ID#, name or any term, entry of name and up to three address lines plus three general information lines per record. *Crockett Software, P.O. Box 1221, St. Ann, MO 63074, cassette or disk $29.95*

Build-A-Word, a 32K educational program that combines the introduction of the alphabet with word building. Parents or teachers may choose words from the environment or classroom tasks and the program is followed by the game, *Guess My Word*, as a direct application of what has been learned. *Thompson House, P.O. Box 58, Kamloops, British Columbia, Canada V2C 5K3, cassette or disk $32.95*

Counting Things V.2, a 32K educational program comprised of three programs: *Matching Things*, *Counting Things* and *Abacus Counting* that offer 12 activities, primary-sized upper- and lowercase letters and built-in instructions for parents or teachers. *Thompson House, P.O. Box 58, Kamloops, British Columbia, Canada V2C 5K3, cassette or disk $32.95*

Error Trap Number Facts, a 32K educational program offering drills in all four math functions (addition, subtraction, multiplication and division), primary-sized characters, the choice of right-to-left or left-to-right entry of answers and the trapping of errors. Lessons can be composed, saved and retrieved through a menu system. *Thompson House, P.O. Box 58, Kamloops, British Columbia, Canada V2C 5K3, cassette or disk $32.95*

Error Trap Spelling, a 32K educational program offering large, primary-sized upper- and lowercase characters, full control of the vocabulary used, menu operation and errors trapped to provide individualized lessons. *Thompson House, P.O. Box 58, Kamloops, British Columbia, Canada V2C 5K3, cassette or disk $32.95*

3-D Graphics Program, a 64K menu-driven program that provides for simultaneous rotation, movement, zoom and animation of 3-D graphics images. Images can be printed out on Radio Shack dot-matrix printers. Included in the package are data for a 3-D depiction of a spaceship and animation examples of a cube. *Logicware, 730 W. McDowell Road, Phoenix, AZ 85007, cassette or disk $32.95 plus $3 S/H*

Pinball Factory, a 64K collection of arcade games requiring a disk drive. Black-and-white graphics are used to increase screen resolution. There are predesigned arcade games and tips to modify them to increase or decrease difficulty levels, and instructions on designing an arcade game of your own including choice of playing field, bumpers, obstructions, rules and logo. *MichTron, 576 S. Telegraph, Pontiac, MI 48053, disk $34.95*

Rommel 3-D, a 32K ML arcade game requiring a disk drive. The scenario places you on a course inhabited by impenetrable barriers and enemy tanks. Strategy, speed and resourcefulness with your tank's cannon are your only hope for escape. *MichTron, 576 S. Telegraph, Pontiac, MI 48053, disk $29.95*

Enhanced Racing Analysis Package, a 32K handicapping program comprised of three programs. Selection one is for thoroughbred racing handicapping and Selection two is for harness racing handicapping to be used to analyze data taken from a racing form and aid in selecting winners at the race track. Both programs accept 12 data items for each entry in a race and assign a number rating (high rating equals favorable choice, low equals unfavorable). Selection three is a bet return analysis to calculate profit or loss for one or more races. *Software Exchange, P.O. Box 5382, W. Bloomfield, MI 48033, cassette $49.95 plus $2 S/H*

TXEDIT, a 64K word processing program requiring a disk drive. Features include Hi-Res graphics screen with display of true descenders of lowercase, 32 by 22 display, formatting features such as left and right margins, margin release, text centering and right justification. Supported are printer features such as underline, bold, italics, superscript and subscript. Can be adjusted for any Baud rate or printer. *H.D.R. Software, 27 Doyle Street, St. John's, Newfoundland, Canada A1E 2N9, disk $44.95*

DSKUTIL, a 64K disk utility requiring a disk drive with printer optional. Comprised of four programs: *Backup* to back up a disk in one to three passes, select disk head stepping rate and warn users if destination disk is not blank; *Diskfind* to track up to 3,000 files kept in alphabetical order and allows users to implement three-character disk IDs as well as print out a directory of disks; *Dcheck* to analyze the directory, point out file structure errors, test sectors and construct pointers to help users avoid bad sectors; *Diskzap* to edit sectors on a disk to aid in salvaging files and comes with scratch-pad calculator mode for performing arithmetic while editing a sector. *Diskzap* alone requires *The Enhancer*. *H.D.R. Software, 27 Doyle Street, St. John's, Newfoundland, Canada A1E 2N9, disk $39.95*

Mathpack, a 64K calculus program requiring a disk drive and *The Enhancer*. The program has five sections: *Integration* to integrate an arbitrary function using Simpson's Rule with input via an `INPUT` statement, making listing or `DEF FN` statement unnecessary; *Root Finding* to find all 'x' such that f(x)=0, for solving equations impossible to solve analytically, with user's control for the interval over which the computer scans and the maximum allowable error; *Cartesian Graphing* to produce a graph of an arbitrary function over an interval you specify; *Polar Graphing* to draw a graph of any function expressed in polar coordinates; *Parametric Graphing* to graph a curve in the X-Y plane expressed parametrically as x=X(t); y=Y(t). *H.D.R. Software, 27 Doyle Street, St. John's, Newfoundland, Canada A1E 2N9, disk $21.95*

Okimate 20 Color and Monochrome High Resolution Screen Dump Program, a screen dump utility for the Okimate 20 printer featuring point and pick menus allowing users to select colors, Baud rates, picture file, picture size and graphics mode. Possible are four different sizes of color dumps and four different sizes of monochrome dumps. *Moreton Bay Software, 316 Castillo Street, Santa Barbara, CA j93101, screen dump program $29.95*

Correction

"Received & Certified" (January 1986, Page 188): *Pro Golf* from Computerware is available only on disk as listed. The price, however, is $29.95 instead of $49.95. We are sorry for any inconvenience this may have caused.

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW's reviewers for evaluation.

— Monica Dorth

REVIEWING REVIEWS

XPNDR2

Editor:

I was very pleased with the positive review by Jerry Semones of our CoCo interface hardware.

As described in the February 1986 review [Page 213], there is a connector on the XPNDR2 card for mounting a disk controller or ROM pack. What is not mentioned, however, are the spring clips on each side of the connector. The XPNDR2 is a unique design, but those spring clips are what really set the card apart.

Take a look inside the cartridge port of any CoCo. You will see similar clips on each side of that connector. These are to provide a good ground connection between the CoCo computer board and the disk controller, necessary for reliable disk I/O and elimination of interference patterns on the screen. Without the spring clips on the XPNDR2 card this ground path would be lost.

I have observed that not every expansion product offered for the CoCo provides this solid ground connection. I can understand why — those clips are not readily available and it took several weeks of hard work to design and have machined a tool for forming them. To make the clips, we purchase precision stamped flat blanks of beryllium-copper (the right stuff), form them ourselves, send them out for heat treating so they will never lose their grip, have them nickel- and gold-plated so they will never corrode and finally assemble them with the XPNDR2. It's a lot of trouble but well worth it in terms of performance.

Mr. Semones noted the LED on/off indicator on the XPNDR2, but it's not just any old LED. It's a state of the art device that operates on only 2mA instead of the normal 20mA. The fact that they cost over twice as much is OK; with a power budget of 300mA at 5V, those 18mA might be needed by someone.

It's not every month you get a review in RAINBOW, and I wanted to let everyone know about the professional effort that goes into the design and manufacture of our products. We've sold these cards to many companies, including General Motors and DEC; they're used in university labs all over the country and also by many individual experimentalists; they've been used to interface the CoCo to everything from a mass spectrometer to music synthesizers. I can't imagine supporting these projects with anything but the best.

Herb Hart
Robotic Microsystems

Hi-Res+ and Label Maker

Editor:

My thanks to Chuck Wozniak and Bruce Rothermel for their thoughtful reviews of my programs *Hi-Res+* and *Label Maker* (January 1986, pp. 195-6). I do, however, wish to clarify a few minor points.

In the review of *Hi-Res+*, Mr. Wozniak mentions that the program is "written in BASIC." Nothing could be further from the truth. The program is 2.5 of pure machine language code — this code has been appended to a short BASIC program for ease in copying and loading by the user. This loader can also be modified by the user to include whatever he wishes (as noted in the review). Also, since *Hi-Res+* was submitted to your magazine for review, a new version has been released (Version 1.1). This version corrects a few minor bugs in the original and has a faster screen display routine.

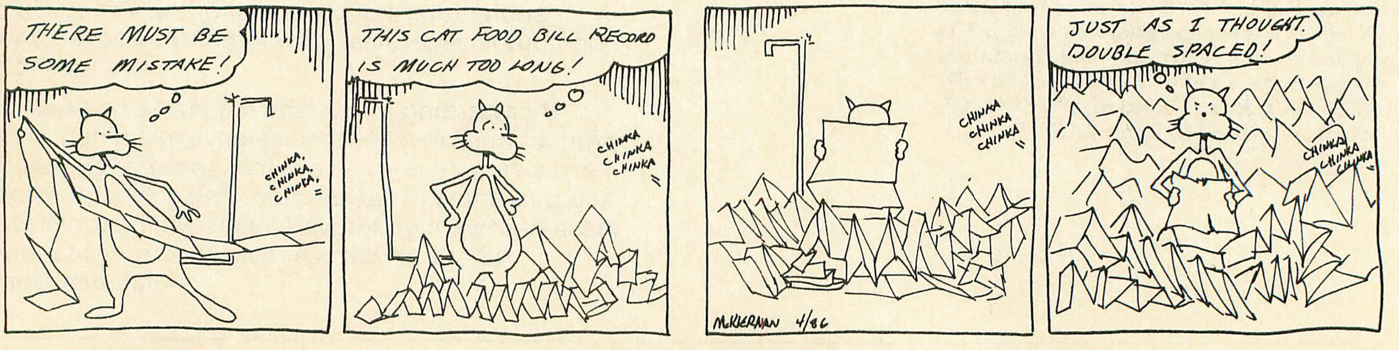
In the review of *Label Maker*, Mr. Rothermel complained about the lack of a "print driver for more popular printers." We have not included printer drivers for a number of reasons, but the main reason is the lack of standards in the printer industry. Even within the same family of printers, there are differences — one printer might have double-strike or near letter-quality; its brother may not. Besides, the editor permits the creation of custom fonts easily. The printer font included is not all that unusual: The Roland printer is identical to ones marketed in the U.S. under the Panasonic name and is compatible with the Epson standard (as is mentioned in the documentation).

The only other oversight in this review is lack of mention of the on-screen previewing. *Label Maker* displays the label on the screen as it is created, just as it will appear on the printer. This includes underline, italics, double-wide and condensed type styles — a major feature.

I hope this helps your readers select from the many fine programs for the Color Computer.

Bob van der Poel
CMD Micro Computer Services Ltd.

CoCo Cat


THERE MUST BE SOME MISTAKE!
CHINKA, CHINKA, CHINKA, =
THIS CAT FOOD BILL RECORD IS MUCH TOO LONG!
CHINKA CHINKA CHINKA
CHINKA CHINKA CHINKA
McKIERNAN 4/86
JUST AS I THOUGHT. DOUBLE SPACED!
CHINKA CHINKA CHINKA

RAINBOW Info

How To Read Rainbow

Please note that all the BASIC program listings in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little cassette symbol on the table of contents and at the beginning of articles indicates that the program is available through our RAINBOW ON TAPE service. An order form for this service is on the insert card bound in the magazine.

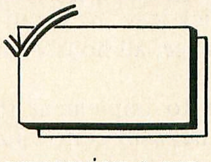
What's A CoCo?

CoCo is an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

However, when we use the term CoCo, we refer to both the Tandy Color Computer and the TDP System-100 Computer. It is easier than using both of the "given" names throughout THE RAINBOW.

In most cases, when a specific computer is mentioned, the application is for that specific computer. However, since the TDP System-100 and Tandy Color are, for all purposes, the same computer in a different case, these terms are almost always interchangeable.

The Rainbow Check Plus



The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS,* type in the program and `CSAVE` it for later use, then type in the command `RUN` and press `ENTER`. Once the program has run, type `NEW` and press `ENTER` to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down-arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR 25,X-1
30 X=256*PEEK (35)+178
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT
   "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

Using Machine Language

Machine language programs are one of the features of THE RAINBOW. There are a number of ways to "get" these programs into memory so you can operate them.

The easiest way is by using an editor/assembler, a program you can purchase from a number of sources.

An editor/assembler allows you to enter mnemonics into the CoCo and then have the editor/assembler assemble them into specific instructions that are understood by the 6809 chip, which controls your computer.

When using an editor/assembler, all you have to do, essentially, is copy the relevant instructions from THE RAINBOW'S listing into CoCo.

Another method of getting an assembly language listing into CoCo is called "hand assembly." As the name implies, you do the assembly by hand. This can *sometimes* cause problems when you have to set up an ORIGIN statement or an EQUATE. In short, you have to know something about assembly to hand-assemble some programs.

Use the following program if you wish to hand-assemble machine language listings:

```
10 CLEAR200,&H3F00:I=&H3F80
20 PRINT "ADDRESS:";HEX$(I);
30 INPUT "BYTE";B$
40 POKE I,VAL("&H"+B$)
50 I=I+1:GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the `&H3F00` in Line 10 to `&H7F00` and change the value of `I` to `&H7F80`.

The Rainbow Seal

RAINBOW
CERTIFICATION
SEAL

The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has been physically seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification. We ascertain that their products are, in actuality, what they purport to be and, upon such determination, award a Seal.

The Seal, however, is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

Elegant *PAYROL/BAS* Solves Payroll Headaches

Here's an office utility that will take care of your payroll chores — and then some. *PAYROL/BAS* is simple, but effective. You only need one drive and a printer. It can organize your office records and all but eliminate the calculator and charts in payroll work.

It calculates pay for up to 99 employees, including overtime (time and a half and/or double time), bonus, commission, F.I.C.A., four possible deductions, plus federal and state withholding. It also keeps track of holiday, sick leave and vacation pay. There's also provision for manual intervention if an employee needs special deductions or a special situation occurs and it is necessary to change the figures before a check is printed.

Deductions can be set up for each employee. Three regular deductions can be either a straight amount or a percentage of gross pay. These are automatically included in each pay for that employee unless you intervene. One added special deduction is allowed each pay cycle to allow for corrections, advances, etc.

The paycheck is printed with an itemized stub showing current deductions and year-to-date totals/ Printing the check automatically updates all employee data for the year.

PAYROL/BAS provides for reprints of checks spoiled in the printer and voiding of errors. It can also void checks that aren't approved later, but employee data in those cases must be corrected separately.

You wouldn't want to use this as a general checkbook because it doesn't balance the account or reconcile the statement, but it can be used to generate checks for a payroll account and up to 29 additional ledgers.

This system is flexible enough to accept employees on various pay schedules. Yet it is savvy enough to keep all figures up to date so proper reports and payments to the state and IRS can be made. Make sure to back up the disk after each operation, and you'll have all the data up-to-date and handy through the year.

The optional *941 Program* prints a report that can be used to complete the quarterly federal Form 941.

At year end W-2 forms are no problem. The optional *W-2 Program* has all the figures for each employee. Just choose that option from the menu (assuming you asked to have that included), load W-2s into the printer and that chore is done painlessly.

I've mentioned "options." Let me make things completely clear. *PAYROL/BAS* has these built-in features:

Employee File Maintenance
All Regular Payroll Calculations
Printing Checks
Check Register
Payroll Summary
Individual Employee Statistics
Search/Update Check File
Year-End Housekeeping
Basic System Cost = $79.95

These options are extra:

941 Program	$29.95
W-2 Program	$29.95

Complete System Cost = $139.85

Each system has tax tables for one state. You need a separate system for each state if your employees are spread out in different locations.

Howard Medical Computers can provide checks and W-2 forms or you can use your own printer stock. It is also possible to let the printer run out the figures to allow you to make the actual checks and forms manually.

The programs are written in BASIC, so custom changes can be made if you're so inclined. The system disk is not protected. You are urged to make backups of the system and all data disks.

The 43-page spiral-bound manual is well-organized and clear. You are walked through each item and there are sample reports. Most screens have instructions at the bottom. The index makes it easy to go back and find things you need help with. If you're still stuck, Howard Medical Computers can answer your questions by phone or mail. I wrote to them to clear up some points and had my answer within a week along with copies of letters from satisfied customers. They deserve an 'A' for customer and product support.

The program itself runs smoothly. Two words immediately come to mind: elegant and professional. The programmer has put lots of experience, logic and planning into this system. I really dug to see if I could find problems.

The system does not check input for invalid data. That means it can send out checks dated 13/99/86 or 02/31/86. Those checks would be hard to search for later because they don't have logical dates. Ms. Bernie Litton explains the code to check invalid data had to be eliminated to make room for tax tables in some states. There is just not enough computer memory.

The CLEAR key is not disabled and I accidentally hit it a few times. It's annoying but not fatal and they've agreed to add a touch here and there to make things a little easier for klutzy people like me.

The program also has no provision for 401-K deductions. Ms. Litton tells me there haven't been any requests for it. Let them know if you are interested in that.

This is an efficient way to reduce payroll work and to get employee information organized and under control. No need to search through old papers to see whether Sam or Sally has used up sick leave or vacation. Simply pull a stat sheet for one employee, all hourly employees or the whole office.

It's not too late to implement this system for 1986. Employee data can be easily edited. Just put in current year-to-date figures and go on from there.

(Howard Medical Computers, P.O. Box 2, Chicago, IL 60690, requires 64K, disk and printer, disk $79.95 plus $2 S/H)

— Bob Dooman

Introducing

CoCo Max™ II

> There is absolutely nothing else on the Color Computer that is comparable to CoCo Max's power and ease of use. The most enjoyable time with a computer I ever had.
> **- Computerware Review May 1985**

> CoCo Max is the most incredible product ever marketed for the CC. No review can do it justice. I've never given any product a 10...I give Colorware's CoCo Max (Hardware, Software and Documentation) a 10!
> **- Color Chronicle Vol III #6**

> I never expected to see anything like it on my CoCo screen. There isn't a single command to remember. Even a person who has no drawing ability like myself can create a presentable picture. I've spent hours just doodling enjoying all the things from silly to the serious. Fascinating experience. Buy it, you won't be sorry.
> **- 6809 Express May 1985**

> An outstanding program that almost turns your CoCo into a replica of the Macintosh. Terrific hi-res color, very easy to learn and use.
> **- Family Computing February 1986**

> CoCo Max puts fun back into computing, offering a state of the art environment you find on much more expensive machines. Colorware has invested the kind of time and research that virtually secures its success, and that shows up on your screen.
> **- Hot CoCo July 1985**

> The pack is well constructed, the user's manual is complete with illustrations and well organized. An outstanding buy for the performance. Colorware's advertisement accurately describes the product. Their delivery was timely as promised.
> **-Rainbow June 1985**

These were reviews of CoCo Max I. CoCo Max II will blow your socks off with even more power!

- New bidirectional shrink and stretch
- New rotate function
- 9 new fonts (for over 200 typestyles)
- A new "Glyphic font" of small pictures
- A 68 page scrapbook
- Point and click to load files (no typing)
- Full error reporting, crash proof
- Custom patterns can be saved
- Printing in color (with CGP 115 or 220)
- Much more. (Note: CoCo Max II is available on disk only)

The reviews are nice, but see it for yourself* and draw your own conclusion.

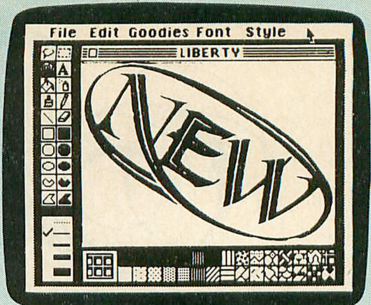
*If you are not delighted with your CoCo Max II, we will immediately refund your purchase, including postage back.

COLORWARE

Call Toll Free 800-221-0916.

For more information on CoCo Max, turn the page.

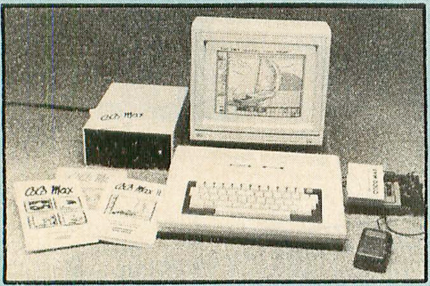
CoCo Max™ II



You'll use it all the time and love using it.

What is CoCo Max ?

Simply the most incredible graphic and text creation "system" you have ever seen. A Hi-Res Input Pack (more on the pack later) is combined with high speed machine language software. The result will dazzle you.



CoCo Max disk system, with Y-cable.

Is CoCo Max for you ?

Anyone who has ever held a pencil or a crayon for fun, school or business will love it. A 4 year-old will have fun doodling, a 15 year-old will do class projects and adults will play with it for hours before starting useful applications (illustrations, cards, artwork, business graphics, flyers, charts, memos, etc.) This is one of the rare packages that will be enjoyed by the whole family.

What made CoCo Max an instant success ?

First there's nothing to learn, no syntax to worry about. Even a child who can't read will enjoy CoCo Max. Its power can be unleashed by simply ***pointing*** and ***clicking*** with your mouse or joystick. With ***icons*** and ***pull down menus,*** you control CoCo Max intuitively; it works the same way you think.

Don't be misled by this apparent simplicity. CoCo Max has more power than you thought possible. Its blinding speed will astound you.

It lets you work on an area 3.5 times the size of the window on the screen.

It's so friendly that you will easily recover from mistakes: The ***undo*** feature lets you revert to your image prior to the mistake. As usual, it only takes a single click.

Later, we will tell you about the "typesetting" capabilities of CoCo Max II, but first let's glance at a few of its graphic creation tools:

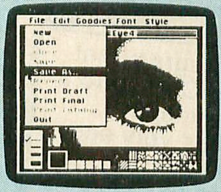
With the ***pencil*** you can draw free hand lines, then use the ***eraser*** to make corrections or changes. For straight lines, the convenient ***rubber-banding*** lets you preview your lines before they are fixed on your picture. It's fun and accurate. Lines can be of any width and made of any color or texture.

The ***paint brush,*** with its 32 selectable brush shapes, will adapt to any job, and make complicated graphics or calligraphy simple.

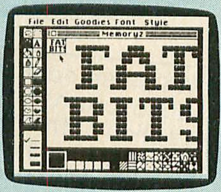
For special effects, the ***spray can*** is really fun: 86 standard colors and textures, all available at a click. It's like the real thing except the paint doesn't drip.

CoCo Max will instantly create many shapes: circles, squares, rectangles (with or without rounded corners), ellipses, etc. Shapes can be filled with any pattern. You can also add hundreds of custom patterns to the 86 which are included.

The ***Glyphics*** are 58 small drawings (symbols, faces, etc.) that can be used as rubber stamps. They're really great for enhancing your work without effort.



Pull down menus



Zoom in !

Control Over Your Work

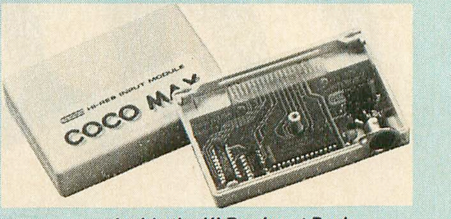
CoCo Max's advanced "tools" let you take any part of the screen, (text or picture) and perform many feats: • You can move it around • Copy it • Shrink or enlarge it in both directions • Save it on the electronic ***Clipbook*** • Flip it vertically or horizontally • Rotate it • Invert it • Clear it, etc. etc.

All this is done instantly, and you can always ***undo*** it if you don't like the results.

For detail work, the ***fat bits*** (zoom) feature is great, giving you easy control over each pixel.

To top it all, CoCo Max II works in color. Imagine the pictures in this ad in color. If you own a Radio Shack CGP-220 or CGP-115, you can even print your work in full color !

There is so much more to say, such as the capability to use CoCo Max images with your BASIC programs, the possibility to use CoCo Max's magic on any standard binary image file. There are also many advanced features such as the incredible ***lasso.***



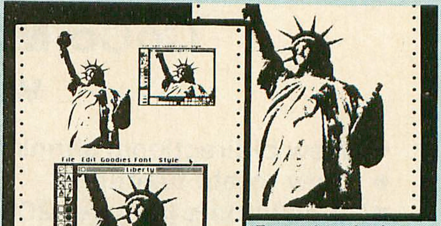
Inside the Hi-Res Input Pack

Why a Hi-Res Input Pack ?

Did you know that the CoCo joystick input port can only access 4096 positions (64x64)? That's less than 10% of the Hi-Res screen, which has 49152 points! (256x192). You lose 90% of the potential. The Hi-Res Input Pack distinguishes each of the 49152 distinct joystick or mouse positions. That's the key to CoCo Max's power. The pack plugs into the rom slot (like a rom cartridge). Inside the pack is a high speed multichannel analog to digital converter. Your existing joystick or mouse simply plugs into the back of the Hi-Res Pack.

Electronic Typesetting...

You'll be impressed with CoCo Max's capability. Text can be added and moved around anywhere on the picture. (You can also rotate, invert and flip it...) At a click, you can choose from 14 built in ***fonts*** each with 16 variations. That's over 200 typestyles !



Examples of printouts

Printing Your Creations

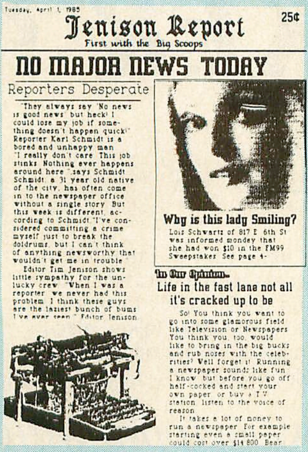
There are a dozen ways to print your work. All are available with a click of your joystick (or mouse) without exiting CoCo Max. Your CoCo Max disk includes drivers for over 30 printers !

All the CoCo Max pictures are **unretouched** screen shots or printouts (Epson RX-80).

CoCo Max II™

The whole family will enjoy CoCo Max. Here are a few examples of the possibilities.

All these pictures are **unretouched** screen photos or printouts (on an Epson RX-80).



Tuesday, April 1, 1985

Jenison Report

25¢

First with the Big Scoops

NO MAJOR NEWS TODAY

Reporters Desperate

"They always say 'No news is good news' but heck! I could lose my job if something doesn't happen quick!" Reporter Karl Schmidt is a bored and unhappy man. "I really don't care. This job stinks. Nothing ever happens around here," says Schmidt. Schmidt, a 31 year old native of the city, has often come in to the newspaper office without a single story. But this week is different, according to Schmidt. "I've considered committing a crime myself just to break the doldrums, but I can't think of anything newsworthy that wouldn't get me in trouble."

Editor Tim Jenison shows little sympathy for the unlucky crew. "When I was a reporter, we never had this problem. I think these guys are the laziest bunch of bums I've ever seen." Editor Jenison

Why is this lady Smiling?

Lois Schwartz of 817 E. 6th St was informed monday that she had won $10 in the FM99 Sweepstakes. See page 4-

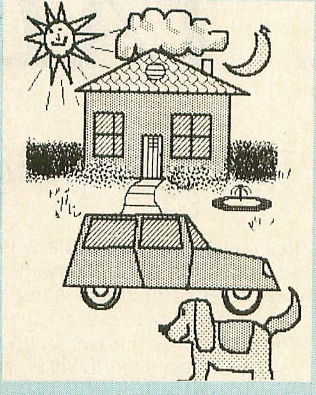
In Our Opinion..

Life in the fast lane not all it's cracked up to be

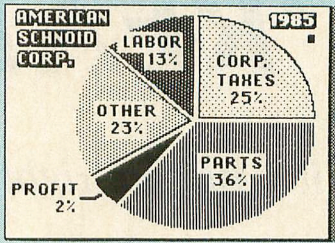
So! You think you want to go into some glamorous field like Television or Newspapers. You think you, too, would like to bring in the big bucks and rub noses with the celebrities? Well forget it! Running a newspaper sounds like fun, I know, but before you go off half-cocked and start your own paper, or buy a T.V. station, listen to the voice of reason.

It takes a lot of money to run a newspaper. For example, starting even a small paper could cost over $14,800. Bear

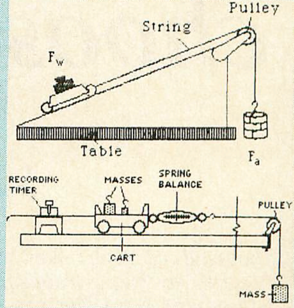
❶ **Publish a newsletter or bulletin**



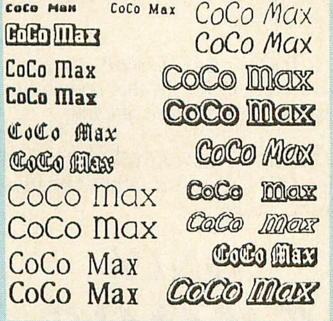
❷ **Fun for children while stimulating creativity.**



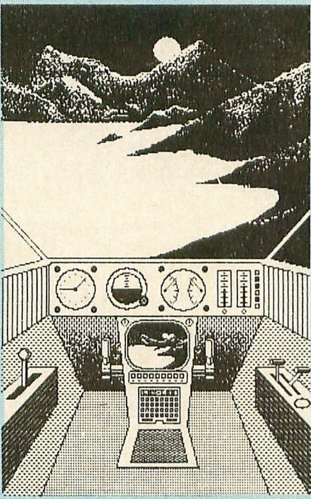
❸ **Business graphs, charts, diagrams. Also memos**



❹ **Junior's homework and science projects. Term papers too!**

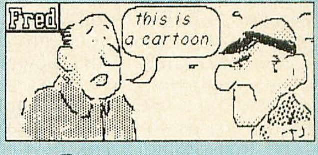


❺ **Over 200 typestyles to choose from! generate flyers.**

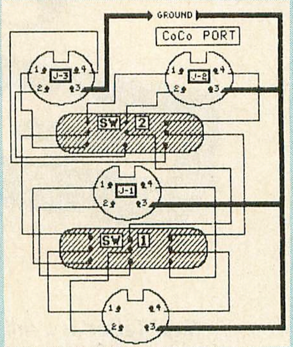


❻ **A new way to express your imagination.**

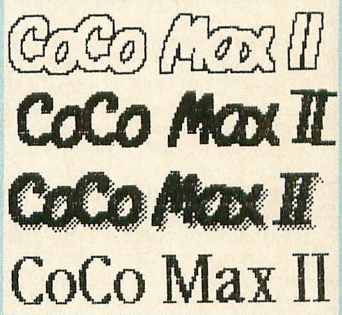
❼ **Video portrait (with optional digitizer).**



❽ **This is a cartoon.**



❾ **schematics and floor plans.**



❿ **Logos and letterheads.**

System Requirements:

Any 64K CoCo and a standard joystick or mouse. (The koala pad and the track ball work, but are not recommended.)
Disk systems need a Multi-Pak or our Y-Cable.
CoCo Max is compatible with any Radio Shack DOS and ADOS.
Note: the tape version of CoCo Max includes almost all the features of CoCo Max II except *Shrink, Stretch, Rotate,* and *Glyphics.* Also, it has 5 fonts instead of 14.
CoCo Max is not compatible with JDOS, DoubleDOS, MDOS, OS-9, the X-pad, and Daisy Wheel Printers.

Printers Supported:

Epson MX, RX, FX and LX series, Gemini, Star, Micronix, Delta 10, 10X, 15, 15X, SG-10, Okidata 82A, 92, 93, C. Itoh Pro-writer, Apple Image-writer, Hewlett-Packard Thinkjet, Radio Shack DMP 100, 105, 110, 120, 200, 400, 500, Line Printer 7, Line Printer 8, TRP-100, CGP-220. (DMP-130 use Line Printer 8), PMC printers, Gorilla Banana.
Color printing: CGP-200, CGP-115

Pricing

CoCo Max on tape with Hi-Res Pack and manual.	$69.95
CoCo Max II (disk only) with Hi-Res Pack and manual.	$79.95
Upgrade: CoCo Max to CoCo Max II New disk and manual	$19.95
New features of CoCo Max II: 14 fonts and glyphic font, dynamic shrink and stretch, rotate, multiple drive capability, 68 page scrapbook, point and click file load, color printer drivers, full error reporting.	
Upgrade: CoCo Max tape to disk manuals, disk and binder	$24.95
Y-Cable: *Special Price*	$19.95
Super Picture Disks #1, #2, and #3 each:	$14.95
All three picture disks	$29.95

Guaranteed Satisfaction
Use CoCo Max for a full month.
If you are not delighted with it,
we will refund every penny.

Font Editor Option

A font is a set of characters of a particular style. CoCo Max includes 15 fonts. You can create new fonts of letters, or even symbols or graphics with the font editor. Examples: set of symbols for electronics, foreign alphabets, etc. $19.95

Video Digitizer DS-69

This new Low Cost Digitizer is the next step in sophistication for your CoCo Max system. With the DS-69 you will be able to digitize and bring into CoCo Max a frame from any video source: VCR, tuner, or video camera. Comes complete with detailed manual and C-SEE software on disk. Multi-Pak is required.

New Low Price Save $50	$99.95
New: faster DS-69A	$149.95

COLORWARE

Colorware Incorporated
79-04A Jamaica Avenue
Woodhaven, NY 11421

800 221-0916
Orders only.
NY & info: (718) 296-5916
Hours: 9-5 Eastern time.

Add $3.00 per order for shipping.
We accept Visa, MC, checks, M.O.
C.O.D. add $3.00 extra.
NY and CT: add sales tax.
Shipping to Canada is $5.00
Overseas, FPO, APO add 10%

Why do more CoCo owners choose 'REAL TALKER'?

Sure it's priced right, but there's more...

Thousands of 'Real Talker' owners know 'Real Talker' beats ALL other Coco voice synthesizers in ease of use and flexibility. And, NO other Coco talker has a clearer, more intelligible voice. That's quite a lot of advantage when you consider Real Talker's unbeatable price. Yet, Real Talker has some important features that you simply will not find in other Coco talkers:

'Real Talker' is compatible with any 16K, 32K, 64K Extended or non-extended Color Computer. It works with any cassette or disk system and comes complete and ready to talk through your T.V. or monitor speaker. Price includes the 'Real Talker' electronic voice synthesizer in a ROM pack, software on cassette (may be transferred to disk), and user manual.

'SAY' command - You'll have your computer talking brilliantly in just minutes thanks to this powerful new command. Type SAY "ANYTHING YOU WANT" and your words are instantly spoken. It's that simple. Think how easy this makes creating speaking Basic programs. Adding speech to your existing programs is a snap too.

'CONVERT' - This is a truly powerful command for the basic programer. CONVERT automatically transforms a machine language dependent speaking program into a stand-alone Basic program. In other words, you can effortlessly write speaking Basic programs that do not require a machine language translator in memory. This is a unique feature of 'Real Talker'. No other voice synthesizer gives you anything even remotely approaching this type of capability - even synthesizers costing considerably more.

'REAL TALKER'
INSTRUCTION
'REAL TALK
HARDWARE VOI
SYNTHESIZER
COLORWARE

'Real Talker' is a full-featured electronic voice synthesizer unit built into a compact cartridge case. You simply plug it into the side of your computer.

NOW INCLUDED WITH 'REAL TALKER'........

1. ***'DR. TALK***-This interactive "Eliza" type psychoanalyst program will discuss your innermost problems at length.

2. ***'TALKING BATTLESHIP'***-It's you vs. the computer in this speaking version of the classic game.

3. ***'TALKING BLACKJACK'***- Play for big stakes against a rather talkative casino dealer.

ONLY

$59.95

Other features include software controlled pitch, unlimited vocabulary text-to-speech, and even a program that will recite any ASCII file (such as from Telewriter-64 & other word processors). You also get Colorware's unique full-screen phoneme editor program that let's you experiment with and modify speech at it's most fundimental level.

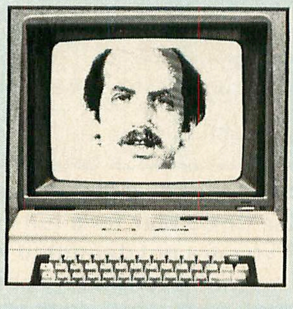
'REAL TALKER-1' (for the original Color Computer)..............***$59.95***

'REAL TALKER-2' (for the Color Computer-2).........................***$64.95***

'Y - BRANCHING CABLE' For disk systems. If you have a disk system but do not have a Radio Shack Multi-Slot unit, this economical cable will allow to connect and use your Real Talker and Disk system together..................................***27.95***

TALKHEAD

If you have a 'Real Talker', do not deprive yourself of this absolutely incredible machine-language Talking Head simulation program. While other talking head simulations use a minimal cartoon-like face, TALKHEAD uses high resolution, full-screen, digitized images of an actual person's face to create a life-like animated effect.



ACTUAL UNRETOUCHED PHOTO

SOFTWARE FOR THE 'REAL TALKER'

TALKHEAD can be easily commanded in Basic to appear on screen and say anything you want. Available on cassette or disk for only $19.95, TALKHEAD requires 64K and a Colorware 'Real Talker'.

ONLY $19.95

COLORWARE

COLORWARE INC.
79-04A Jamaica Ave.
Woodhaven, NY 11421
(718) 296-5916

VISA MasterCard

★★★ ORDERING INFORMATION ★★★

ADD $3.00 PER ORDER FOR SHIPPING AND HANDLING.
C.O.D.'S ADD $3.00 EXTRA.
SHIPPING AND HANDLING FOR CANADA IS $5.00
WE ACCEPT VISA, MASTER CARD, M.O.'S, CHECKS.
N.Y. RESIDENTS MUST ADD SALES TAX.

Pegasus — The Mystical Flight Instructor

You are sitting on a quiet beach looking out over a stretch of calm ocean. In the distance an ominous island sits just at the edge of sight. A shiver runs down your spine and you don't know why. Pegasus, your trusty steed, stamps impatiently. The small black birds you thought you saw earlier are now close enough to explain the unease you've felt all morning — Phantom Riders!

Pegasus leaps into the air with only the slightest encouragement to meet the deadly black foes and their masters. The sea begins to churn as the sharks sense the coming of breakfast. Who will be victorious, the Good Guy(s) on the white horse(s) or the Bad Guys on the black horses?

Yes, boys and girls, we've just been tossed back into a mystical time of flying horses, black phantoms and fire-belching sea monsters. *Pegasus and the Phantom Riders* is the latest in arcade-type game action from our friends at Tandy. Licensed by Spectral Associates to Tandy and written by David Figge, this game requires a Color Computer with one disk drive, 64K of RAM and at least one joystick. If you have a Multi-Pak Interface and the Sound/Speech Cartridge, I'm told you'll have more realistic sounds to go with the game. (I don't own this equipment and couldn't verify this claim.) This game comes on an unprotected disk that allows for backups and is professionally packaged and documented. The game has a pause feature and lists the last five high scores. The closest "real" arcade game to this is probably *Joust*.

The game is started by typing `DOS` or `RUN "PEGASUS"` and the title screen with scores asks for one or two players. If you pick two you can then choose between Duel or Cooperate mode. The first screen is pretty much as the flowery opening of this review states but you won't believe the graphics! They are done in `PMODE 4` type with the artifact colors and details that are just unreal. I presume Mr. Figge has been using one of the latest graphics generator programs because there are textures and colors and details I've only seen in the "CoCo Gallery." There are four different screens, starting from the Good Guys' land with the Bad Guys' island in the distance (easiest), to the lagoon of the Bad Guys' island (hardest).

The play is somewhat straightforward; to fly Pegasus you flap his wings by pushing the firebutton on the joystick — one push, one flap. The more you flap the higher he goes until he hits the sky (top of screen) and rebounds from it in direct proportion to the speed with which he hits it. If you stop flapping, gravity takes over, though there is apparently some form of momentum in this mystical land. Motion in other directions is controlled by the left/right motion of the joystick.

To destroy the enemy, you need to kick the Phantom's horse (Pegasus is kicking while he's flapping). You must be slightly higher than the enemy to kill him. If you're dead even, you'll just bounce off each other and if you're below him, you become shark bait and lose one of your four lives. If you win the kicking battle, you shoot off in the opposite direction with a fair amount of velocity to overcome.

Points are scored for kicking the black horse, which kills the horse but not the Black Phantom. The Phantom falls to the ground unless you can catch him, a most remarkable feat. If the Phantom is allowed to crash to the ground, a grave is erected. If you kick the cross above the grave, you score more points for destroying the Phantom's grave. If you don't destroy the grave, the Phantom is resurrected after a period of time and you fight him again. Each screen gets more difficult because there is less area to land Pegasus for rest and there are more phantoms. In fact, on the third screen the kraken, a sea creature, starts belching fire.

If all this sounds confusing, it is. I still don't feel very comfortable flying Pegasus. But since I'm not the greatest arcade-game person in the world, I thought it would be wise to try this game out on one more adapted to this sort of thing — my 12-year-old son, Tim. I handed him my brand new deluxe joystick and walked into the next room.

Several hours later he was still mumbling under his breath what a dumb game this was and it was no fair and stupid. Well, that was last week. Now it's "Hey, Dad, I just beat the 50,000 high score." There is a recommendation buried in here somewhere and I think it says this game is for those who like a stiff challenge.

We agreed the worst part of game play was having to repeatedly hit the firebutton on the joystick to make Pegasus fly, to say nothing about how often I'm likely to have to replace that button. Tim was also distressed when he found he couldn't save his high scores to disk.

The documentation is a well-written booklet that is 10 pages long and filled with everything you need to know, including turning on the computer. The manual also has two appendices, one contains disk format and backup instructions and the other explains using the sound cartridge and Multi-Pak. Also included is the software registration card and change of address cards. There is one addendum with my manual describing how to run *Pegasus* without the `DOS` command. The only ommission I found was the fact that you get an extra man (horse?) when you score 10,000 points. Actually, Tim discovered that; I haven't scored enough points yet!

Should you buy this game? If you have an old, arthritic firebutton finger like me, maybe you should stick to checkers or the like. However, Tim says if you can get used to the flying action, it's a great game. It is available at your local Radio Shack store, so go take one for a test flight, but don't expect to instantly master the game.

(Radio Shack stores nationwide, Cat. No. 26-3281 Tandy, disk $24.95)

— C.L. Pilipauskas

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XMENU Can Tie OS-9 Utilities Together

XMENU is a program that helps a programmer create a menu-driven environment for OS-9. While I think this program will be best appreciated by a programmer who is writing software for someone not interested in the details, in general, *XMENU* is a tool that can help tie many separate OS-9 software products or procedures together into a single integrated system. This can benefit the experienced hacker and the novice user as well as the end user of a software package.

Software designers can concentrate on the technical aspects of the program and then use *XMENU* to provide the menu interface for the customer who may or may not be concerned with how the program goes about accomplishing whatever it does. The OS-9 user can use *XMENU* to tie together all those utilties that are used daily into one program.

XMENU comes with 12 pages of documentation, but this is sufficient for anyone with experience with OS-9, no matter how little. As with MicroTech Consultant's products *XTERM* and *XWORD*, *XMENU* works with PBJ's *WordPak*. As a matter of fact, *WordPak* is recommended for the best efficiency of memory and ease of use.

XMENU uses about 16K of your memory and OS-9's overhead takes another 20K. If you use a Hi-Res program to give you something other than 32 columns, that takes up even more memory. As you will quickly realize, memory can become very precious. That is the main reason an 80-column board is good to have with *XMENU*.

XMENU is fairly easy to implement and incorporate into your programs, thus chaining your many programs together into one main program. A sample menu is even included on the disk. The manual goes through a few examples that demonstrate the process of creating and modifying a menu very well. Of course, you can have one menu call another and chain any number of programs together even across different diskettes.

Overall, *XMENU* can be extremely useful to those programmers who have many programs they would like to incorporate into a larger, but still manageable menu-driven package, either to market or for personal use. While the documentation is not extensive, the examples are well-done and explained, making the documentation adequate.

(Microtech Consultants Inc., 1906 Jerrold Ave., St. Paul, MN 55112, $29.95, with source $59.95, plus $3 S/H)

— Dale Shell

Superdisk Cuts Routine Operations Down to Size

Superdisk is a handy disk utility that will save you a lot of time and effort doing routine operations on your CoCo. The program is supplied on a single diskette that is not copy-protected. Backup copies for your own use are encouraged.

The program is menu driven and very user friendly. The main menu provides these features:

1) A two-column, on-screen disk directory with numbered file identifiers. Simply type in the two-digit filename identifier, press ENTER and the selection is loaded.

2) A DIRECTORY BACKUP command is provided. This can be a real lifesaver if your disk directory ever becomes damaged.

3) With PROMPTED COPY you can perform a single drive copy or, with two drives, copy 0 to 1 or 1 to 0 by simply entering the file identifier number.

4) The READ or MODIFY function displays on the screen a particular sector and track in hexadecimal and ASCII format. You can then page up and down in the file and enter the edit mode to make changes. Although this is a powerful feature, it must be used wisely. The program is not a tutorial on machine language or disk file modification, so care must be exercised. Use your backup disk.

5) PROMPTED KILL is also provided. This allows killing of unwanted files after answering 'Y' or 'N' to allow a last chance to abort your decision if you made a mistake.

6) A printed directory is also provided. You can name, rename and date your disk directory. The directory is printed in two columns with a file identifier number, file and disk name.

The documentation consists of four typewritten pages of instructions that are easy to read and understand. Also included is a modified plug that fits into the right joystick socket and must be in place for proper program operation.

I found *Superdisk* to be very useful and with many features to make your CoCo even easier to use. At only $9.95, I think it's a bargain.

(Sunrise Software, 8901 NW 26 Street, Sunrise, FL 33322, $9.95)

— David Gerald

Hint . . .

Disk or Cassette I/O Errors?

Make sure the disk drive(s) and cassette recorder are not on the left side of the TV set (or if they are, that they're at least six inches or more away). This is because a TV set's flyback transformer, almost always on the left side of the set, puts out a strong magnetic field which can interfere with cassette or disk operation.

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Students Learn at the *Trading Post*

As a sixth grade teacher and the computer coordinator for my school district, I am always looking for good programs that challenge as well as stimulate students. When I received *Trading Post* I was eager to see if Sunburst Communications' program was as good as its attractive package and documentation. I have seen Sunburst software written for the Apple II computers and was very impressed with it. Virtually all of their programs are designed by professional teachers or professors, then programmed by a computer programmer. This way they can get the best of both the teaching professional and computer specialist. It is nice to see companies that market predominantly Apple or Commodore software expand their market with CoCo software.

When evaluating software, I have found that if I can start up and run a computer program without looking at the manual I probably have an above average program. I could do this with *Trading Post*. It has the loading instructions on the disk and all the instructions to run the program are in the program. I didn't even need the documentation to use this program, though it was nice to have. It includes worksheets that can be reproduced to help students develop strategies for reaching their trading goals. There is also a scope and sequence of objectives for the program, as well as a computer section that gives you a step-by-step procedure for turning on, running and ending the program.

Trading Post is designed for students in the third to seventh grade. Players try to obtain goods by trading what they have for what they need. The object is to be the first person to collect all the shapes needed to match a goal selected for them by the computer. Each player takes a turn in which they can choose to get a random object from the computer, to trade what they have according to a set of exchange rules to obtain other items, or see if they have reached their goal. They choose "goal" when they think they have everything needed to match their trading goal and the computer checks to see if they are right. If they are right they get a point; if they are wrong they lose their turn. When their goal is reached twice, they win the game. There are three levels of play: beginner barterer, assistant swapper and terrific trader. Each level increases in difficulty to make it more challenging for older students.

I like this program. The graphics are well-done and the objectives are appropriate for a classroom or home setting. The documentation is complete and the program easy to work with and understand. I do think that the price for the program is a little steep for home use, but shouldn't be a concern for schools.

(Sunburst Communications, 39 Washington Ave., Pleasantville, NY 10570-9971, requires 32K ECB, $59 per disk or $177 for computer lab package)

— Thomas E. Nedreberg

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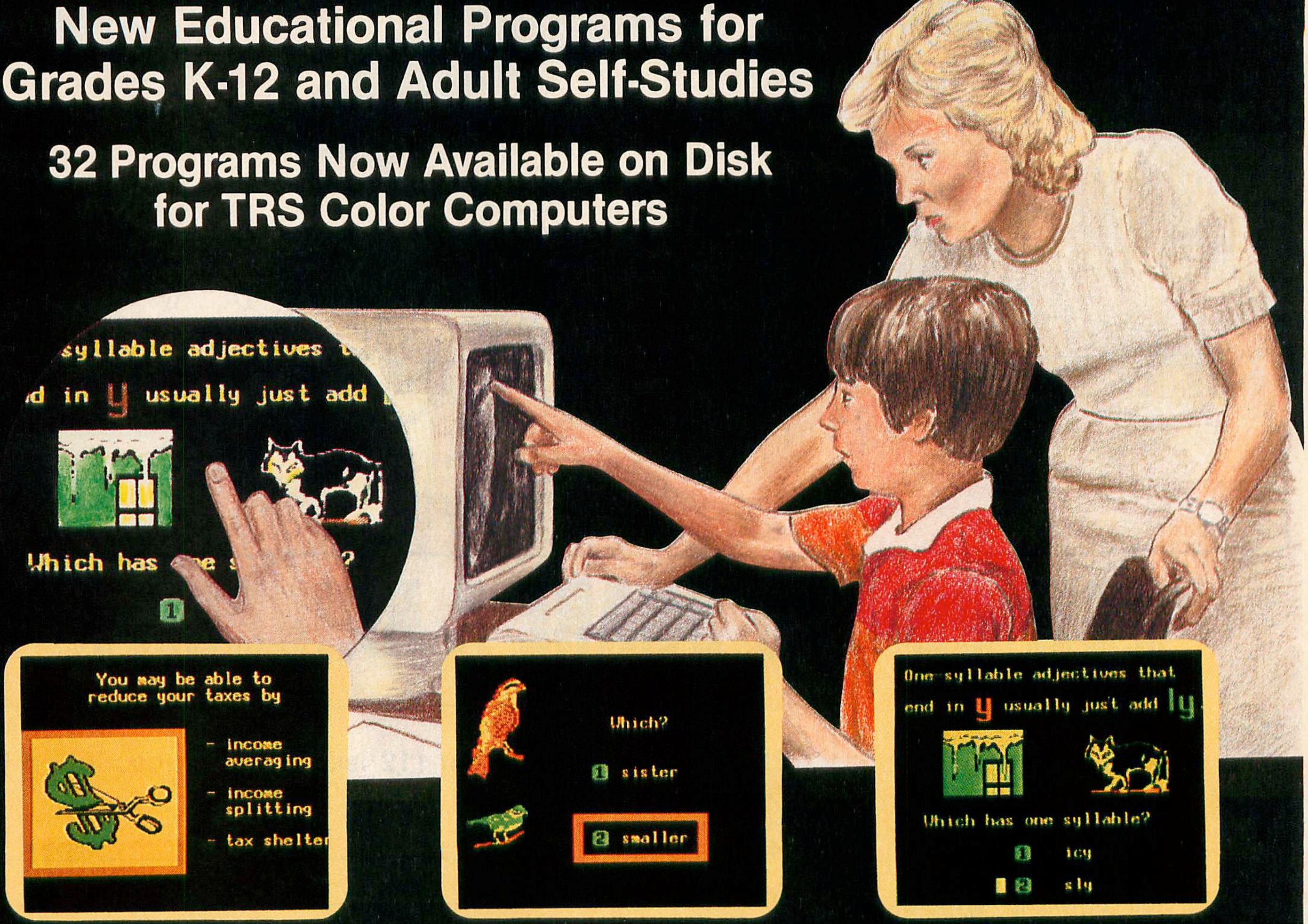
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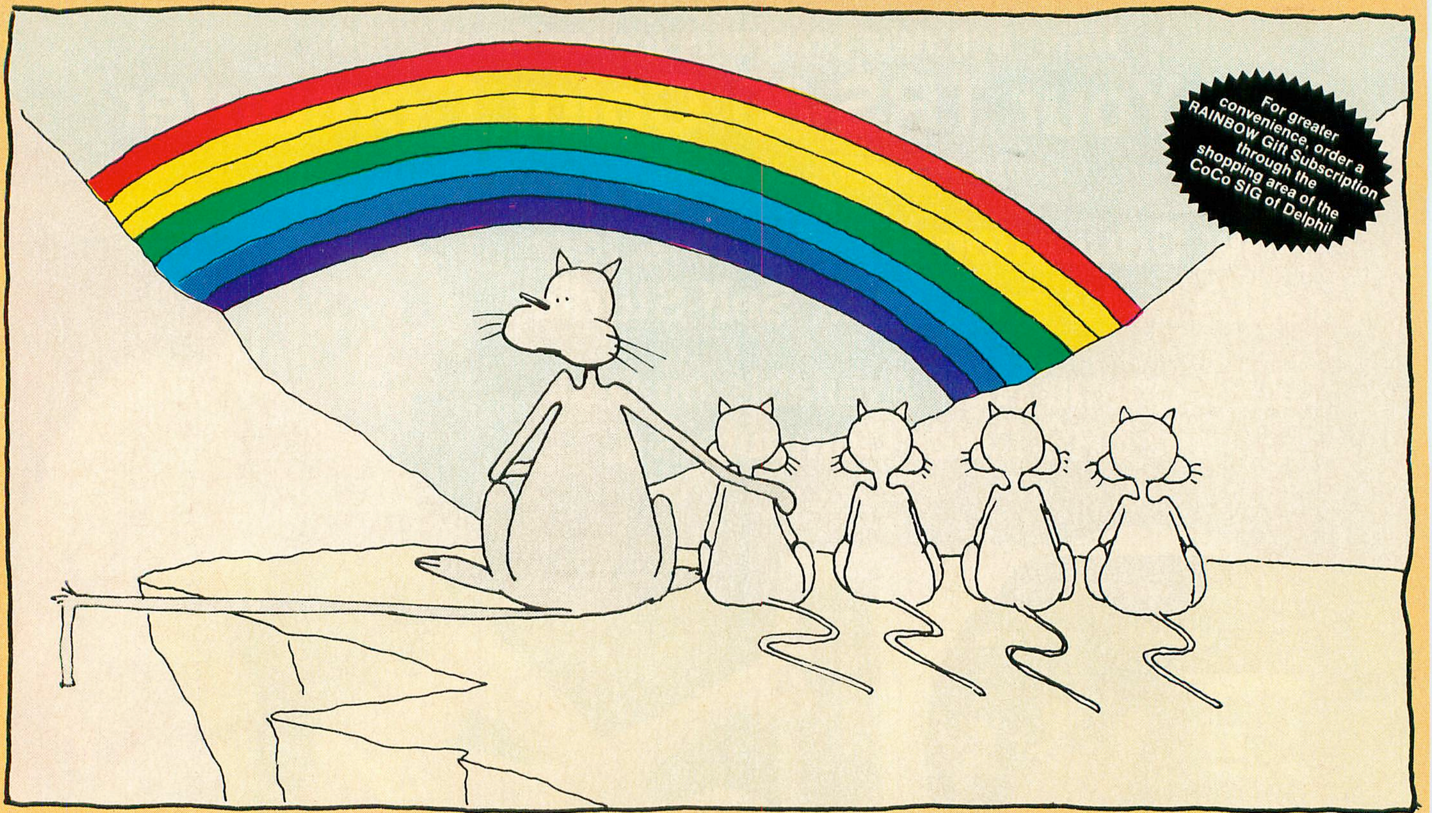
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Color LISP is a New Language for CoCo

A new language for CoCo! I was really happy to get a shot at reviewing something as exciting as this. It's fun to exercise your mind with something new.

LISP is a list processing language similar in some ways to FORTH, including an awkward way of handling mathematical formulas. For example, BASIC's ? 2+2 becomes (+ 2 2) in LISP. There are new programming terms to learn, ATOM, LIST and PREDICATE, among others. Spacing is very important and everything is written within parentheses.

Frost Byte offers *Color LISP* as a "minimum implementation" so we can begin to experiment with artificial intelligence. It's available for either cassette or disk. Except for disk operations, both versions have the same commands and functions.

Color LISP does come with a 26-page printed manual that explains the syntax of commands, but it is definitely not a tutorial on the language. The manual suggests several books for learning the language. None of the computer shops or book stores around north suburban Chicago had anything on LISP. I had to resort to a major library search to find any help. I did finally get all the books they suggested, but much of what I found doesn't seem to work with this version of LISP.

The manual was confusing to me. The syntax examples show square brackets when they mean parentheses. And several other examples typed out of the manual produced a frustrating error message. I tried both the tape and disk versions with the same result.

This is definitely not a package for the uninitiated. There is no LISP software available for CoCo. But if you already speak LISP, here's an interpreter that will make your CoCo understand you. Frost Byte does solicit contributions to their Software Submissions Program.

(Frost Byte, P.O. Box 169, Underhill, VT 05490, cassette $39.95 plus $2 S/H)

— Bob Dooman

Two-Liner Contest Winner . . .

Noscroll demonstrates how to prevent screen scroll when displaying long lists of items. It should make an excellent subroutine.

The listing:

```
0 CLS0:FORX=1TO50:PRINT"LINE# ";
X:IFPEEK(1408)<>128 THENPRINT:PR
INT"PRESS ANY KEY TO CONTINUE":E
XEC44539:CLS0
5 NEXTX
```

Greg Wood
Lynnville, TN

(For this winning two-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Adventures* and its companion *The Second Rainbow Adventures Tape*.)

CoCo Knitter — A Real Purl for Volume Producers

The idea behind *CoCo-Knitter*, from Sugar Software, is a good one: using the computer to produce individual sweater patterns for classic sweaters ranging in size from babies through adult male. The program produces patterns for cardigans or pullovers, with round or V-neck, raglan or set-in sleeves, in any of the three standard yarn weights (fingering, sport and worsted). The cardigan pattern includes a one-inch wide garter-stitch front panel for the buttons and button holes. The desired pattern can either be displayed on the screen or printed out.

My collection of knitting pattern books and magazines goes back 25 years, so to test this program I did not actually knit any sweaters, but compared the patterns generated by the program with patterns I have used in the past. In general, there was good agreement between the two. The one major difference is that *CoCo-Knitter* instructs the user to bind off the stitches at the neck then subsequently pick them up for the neckline ribbing. Other knitting sources instruct the knitter to place the center stitches on a stitch holder and use these for the ribbing. The latter method produces a neater neckline and is also much simpler.

The program's patterns suffered from minor typos and in some cases omitted the number of purl stitches for the ribbing. Although the booklet states that the program is designed for an 80-column printer, the printed pattern produced is only 32 columns wide. The screen display occasionally splits words in an undesirable fashion.

An experienced knitter would have no difficulty following the patterns to produce sweaters, but a beginner would probably need a good introductory text. The instruction booklet accompanying the program details how to load the program and use it, as well as specifying stitch gauges for the different yarn weights. It does not include the type of instructions common in knitting books on how to test stitch gauge, or finish and block the pieces. There are no photographs of various finished sweaters in the leaflet, although most knitters enjoy seeing pictures of the finished product, even when the sweater is of a classic type.

The real usefulness of this program seems to be for the knitting shop owner who could knit some models and then quickly produce an individualized pattern for each customer. People who hand-knit sweaters for bazaars and craft fairs where large numbers of sweaters in a complete size range must be produced would also appreciate the ease with which a printed pattern is created. I could find no current book that covered the entire range of sizes and types included in the program, and a person wishing instructions for all the sweaters in the program would need about six separate leaflets.

For volume production, *CoCo Knitter* is a good timesaver well worth the price. But it is, perhaps, a bit expensive for the average home craftsperson.

(Sugar Software, 1710 North 50th Avenue, Hollywood, FL 33021, 32K ECB disk or tape $24.95 plus $1.50 S/H)

— Carol Kueppers

15-Meg Hard Drive Accelerates CoCo's Power

I remember it was an overcast day in Southern California as I carried that box into the computer room. This 15-Meg Hard Drive was only 14 by 15 by 4 inches, but little did I know what power it would unlock in my Color Computer. You see, my Color Computer (named CC) is just a little guy, someone who helped me with my work and never demanded at all. But boy, did he change on that day!

After carefully removing the hard drive from its box, I placed it on the desk to the right of CC. He just sat there with a blank look on his screen (the power was not on yet). After plugging in the power cord from the accessory kit and putting in the first key, the power switch, I placed the second key in a safe place (my software fire safe).

Next, I opened up the Hard Disk Controller (Cat. No. 26-3145) and plugged it into Slot 3 of the Radio Shack Multi-Pak Interface. After plugging in the 50-pin cable in the back of the hard disk drive, I powered up the system.

CC's screen glowed green waiting for me to boot up OS-9 and get to work. After typing in the date and time CC came to life with, "Hello Steve, what are we doing today?" This is the way CC addresses me (by using Speech/Sound Card) when first powered up.

"Well CC," I said, "today I am adding a Hard Drive to your system!"

I told CC that a hard drive is a high speed, high density mass storage device. The one I selected is Tandy's 15-Meg Primary Hard Drive (Cat. No. 26-4155). This drive can store up to 93 disks of data that can be accessed up to 20 times faster. Now with this added power you should be able to keep up with those so called "big computers."

For CC to use the hard drive under OS-9, I needed to load in the device descriptor (H0) for the 15-Meg and *CCHDISK* driver into memory. Every I/O (Input/Output) device must have a software driver so the computer can communicate with it.

"Hey Steve, I still can't see the Hard Drive!" CC said in a demanding voice. I think CC was in a hurry; I had not even linked the device yet. To load and link in the drives for the hard drive for the first time it is necessary to type:

```
LOAD /D1/MODULES/H0_15.DD
LOAD /D1/MODULES/CCHDISK.DR
LINK H0
```

(Note: The MODULES directory is on the CONFIG disk of the OS-9 2.00.00 upgrade)

"Steve, I can communicate to the hard drive now, but I can't read anything off of it."

True, CC could not read the drive yet. Just like a floppy disk, the computer can't read (or write) anything to it until it has been formatted.

After CC took about 10 minutes to format the hard drive, I was all ready to copy the system commands to it.

First, I told CC to make a CMDS directory on the hard drive by typing in `MAKDIR /H0/CMDS`. "That was fast!" CC exclaimed. I was also surprised at the speed the command was executed.

Next I had CC copy the CMDS directory from a system disk to the hard drive. Once again it was about five times faster then just using a floppy drive.

Once the commands were on the hard drive, I could have CC read them. So I typed in `CHX /H0/CMDS`. Now, for the real test, to have CC use *only* the hard drive to do something, I typed in `DIR /H0/CMDS`. Within a second CC was displaying the command's directory. It was as fast as a RAM drive I had been using until now.

"Hey Steve, I really like this, this is better then that RAM drive. Besides having more room, the data is still there after the power is turned off."

Needless to say CC and I spent the next few days playing with the new toy. I copied all of my OS-9 software to the hard drive. At this time I have only used approximately 25 percent of the space on the disk.

The only disadvantage with CC running the programs so much faster is that he now complains about how slow I am. He has gotten so demanding these days!

This hard drive system from Tandy is only for use with the OS-9 (2.00.00 or later) operating system and will not work with Microsoft Extended Disk BASIC. If you want to use the Tandy Hard Drive with any other operating system besides OS-9, you must write your own software drivers for it.

Included with OS-9 Version 2.00.00 are the device drivers and descriptors for using the 15-Meg (Cat. No. 26-4155, $1,595) and 35-Meg (Cat. No. 26-4171, $2,995) hard drives. The Color Computer Hard Disk Interface (Cat. No. 26-3145) sells for $129.95. At these prices, it's unlikely numerous hard drive systems will be sold. But for users like me, the hard drive is well worth the price.

The 15-Meg Hard Drive system was faster than I expected it to be. Almost as fast as the RAM drives I had been using to speed up my disk I/O. Of course the hard drive has 14,500,000 bytes more and does not lose the data when power is turned off.

(Tandy Corp., 1700 One Tandy Center, Fort Worth, TX 76102, $1,595)

— Steve Bjork

See You at
RAINBOWfest-Chicago
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One-On-One Basketball Scores High

Basketball: slam dunks and three-point plays, percentage shots and fade-aways, baseline jumpers and "in yo' face," Larry Bird and Dr. J. . . .

Wait a minute! The Bird Man and Dr. J.? We're talking serious round ball now. And that appears to have been the goal with *One-On-One*, Tandy Corporation's latest contribution to the world of Color Computer sports. They even went so far as to solicit ideas from the principals who inspired this make-believe match-up. That's right. Larry Bird and Julius Erving actually assisted in the design of this game. Good move, Tandy.

To play *One-On-One* you'll need a Color Computer with 64K memory, one disk drive, a television (preferably color) or monitor and at least one joystick — two if you want to play against a human opponent. (And you will want to unless you enjoy being humilated by your CoCo.) You can try several variations of the game by choosing from the following options:

I. Game type
  1) One on one
  2) Winner's outs
  3) Loser's outs
II. Level of difficulty
  1) Park and rec
  2) Varsity
  3) College
  4) Pro
III. End of game
  1) Timed game (two, four, six or eight minute quarters)
  2) Set score (any number of points less than 100)
IV. Play mode
  1) Either player against the computer
  2) Two players

In any basketball game, computerized or otherwise, you would expect to see slam dunks, steals, rebounds, blocked shots, fouls, free throws and a scoreboard clock. If you're the demanding type, you might feel a little disappointed without a 24-second shot clock or the opportunity to witness a fancy, turnaround jump shot. In addition to all the aforementioned, *One-On-One* includes such neat features as slow-motion replays, three-point shots, a fatigue factor for each player, which is continuously monitored on-screen, a backboard that shatters under the strain of a particularly ferocious dunk and the finger-pointing fellow in the striped shirt who comes running out on the court blowing his annoying little whistle at the most aggravating times. All these ingredients form a combination that gives a good "feel" for the game.

However, I believe *One-On-One* can be improved. I offer the following suggestions/comments: 1) While the documentation is clear and well-presented, I think the addition of a glossary of basketball terms would be a welcome enhancement, particularly for those not so familiar with the game. 2) The graphics are well-done but the sound effects are very unimaginative. 3) I would really like to see that three-point shot go in occasionally, especially when my opponent has a big lead. 4) Perhaps the most serious oversight is the fact that the scoreboard does not show the quarter or the number of timeouts each player has remaining. Granted, these are minor faults. At the same time, they are weaknesses that can be corrected by a few minor program changes. I believe it would be worth the effort and would make a good product even better.

In summary, the positives of this game far outweigh the negatives. Anyone looking for a fast-paced game that requires both coordination and quick thinking will not want to pass this one off. Tandy has a winner with *One-On-One*.

(Tandy Corp. available in Radio Shack stores nationwide, requires 64K, disk $39.95)

— Martin Shell

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Adventure Winner *Rescue on Alpha II* is Fun and Tricky

You are an agent from the Galactic Secret Service sent to the planetoid Alpha II to rescue a kidnapped professor and his invention, the Biotron. Once you have found them you must destroy the planetoid.

The professor was kidnapped by Zarkon, an evil space wizard. He is holding the professor in a bunker on Alpha II. Using the Biotron, Zarkon has made an army of mutated monsters, which include numerous sand snakes and the deadly Gorma.

Rescue on Alpha II, by Mitchell Software, is a graphics Adventure game that requires a 32K Color Computer and is available in either cassette or disk format. The disk version is the subject of this review. *Rescue on Alpha II* is written in BASIC and uses the Hi-Res screen for both text and graphics. The upper half of the screen displays a picture and the lower half provides a description of the surroundings. Since the program is written entirely in BASIC, screen update is slow unless your system supports the high-speed `POKE`.

At the start of the game, you are beamed down to Alpha II without equipment, weapons or supplies. The beaming device only works in one direction, so you must find another way home. You must go to the bunker and look for objects that will help you get past the monsters and find the professor. Each game is different in that the objects are placed in different locations. The robot guards shoot at you and if they're lucky, destroy one of the objects you are carrying. You must also beware of the killer robots. If you're lucky enough to make it past the robots, you face the sand snakes, the Gorma and, of course, Zarkon. Finally, if you find the professor and his equipment, you must overload the bunker's reactor and escape before the planetoid explodes.

The game has a small number of verbs it understands, which makes it harder to play at times. You type commands in two-word phrases like GET GUN. The graphics are well-done with a three-dimensional view of the room or hall. As with all Adventure games, it helps to draw a map of the places you've been to.

The program is well-done but has one major flaw, which seems to be inherent in many Adventure games — no `SAVE` feature. I find it hard to believe that even the author can play the game straight to completion without going buggy. Maybe some die-hard Adventurers will be able to complete an Adventure in one sitting, but the average mortal must get up in the morning for school or work!

Many readers will remember this game as the 1984 RAINBOW Adventure Contest grand-prize winner. That version would only run on a tape system. The author has rewritten the program to operate on a disk system as well as a tape system. The disk version uses a number of disk files for storing parameters that control the game. Thus, the disk must remain in the drive while playing the game. I should also point out that the game is not copy-protected, so it is easy to make a backup copy for your personal use. *Rescue on Alpha II* is a good game with some tricks and some tricky areas. It is overall a very pleasing game.

(Mitchell Software, P.O. Box 194, Tomahawk, WI 54487, 32K cassette or disk $14.95)

— Christopher L. Dollberg

One-Liner Contest Winner . . .

Granmap will print out the granule structure of the disk system. A disk drive is not required.

The listing:

```
0 PRINT#-2,TAB(32)"GRANULE MAP":
PRINT#-2:FORG=0TO33:T=INT(G/2):S
=G-(T*2):PRINT#-2,"GRAN.";G;TAB(
11)"TRACK";T;TAB(21)"SECTORS";TA
B(30-S)S*9+1;"-"S*9+9;TAB(38)":"
;TAB(41)"GRAN.";G+34;TAB(52)"TRA
CK";T+18;TAB(63)"SECTORS";TAB(72
-S)S*9+1;"-";S*9+9:NEXT
```

Lynn M. Owen
Yucca Valley, CA

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Adventures* and its companion *The Second Rainbow Adventures Tape.*)

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Software Review

CoCo Windows is Well-Programmed and Useful

There's another "other guy" out there working the Sierra Software Mine in the badlands of Utah named Bob. He's teamed up with the first "other guy," Joe. Joe and his sidekick, Bob, rode into town not long ago. After they loaded up their wagon with supplies and whatever gear software prospectors need (a lot of coffee, I bet!) from the general store, they stopped by the Wells Fargo stagecoach station and shipped off a shiny new program, *CoCo Windows*, for the folks back at THE RAINBOW Ranch in Kentucky to look over.

CoCo Windows is a combination utility/applications program. Unlike most of The Other Guy's Software, it can be backed up to a working copy. Not only that, but the copy you buy is personalized at no extra charge. Your name appears in the title billboard and on every last backup you make. So, if an "unauthorized copy" of your original is circulating, you'll find yourself well-known before long!

Boot up is to a Hi-Res screen editor with key-click plus some options. You can change screen color, for instance, with a two-key command, using CLEAR along with a letter, or toggle reverse color via an ASCII command — `CHR$(12)` not particularly elegant, but reliably functional. Another two-key command brings up an easy and handy auto-numbering, within a window, for BASIC programming.

Now they could quit with a program fairly priced at $20, but they don't. The screen editor is just the beginning. BASIC programs can be loaded and run, and during the course of the run other CLEAR-plus-character combinations call down such features as a calculator window, capable of four arithmetic functions on values of -1 E38 to +1 E38 and offering 10 memory storage locations corresponding to the keys 0-9; a window with a menu permitting the simple change of printer parameters from the CoCo defaults; and a window whereby the keys of the Q-P row may be programmed, in several storable routines, as PC-style function keys, `RUN`, `SAVE`, `LOAD` and so on when used along with CLEAR, the "control" key.

And as if all that weren't enough, you can create windows of your own preference, ranging from 48 by 22 rows down to 3 by 1 and containing text, numbers or graphics. Again, the procedure is by a series of `CHR$` numbers representing characters, rows and starting points on the 'X' and 'Y' axes. The number of windows that can be created is limited only by the amount of memory available.

There are no bugs in the program itself. However, there is a fundamental limitation — essentially that of the hardware — that keeps *CoCo Windows* from becoming the CoCo's applications answer to the PC's *Sidekick*. The "Applications" section of the documentation describes the technique for incorporating *CoCo Windows* into a BASIC program, as well as calls from a machine language program. In practice, however, I found that only a limited number of programs in BASIC — and none of the ML programs in my library, not even those restricted to the lower 32K — would support *CoCo Windows*. A program either crashed or hung up if it had an ML routine of any kind in it: sort, spooler, etc. *Elite*Calc* 1.2, for instance, even after cutting out the Hi-Res title screen and using the old 32K boot, simply hung up with garbage on the screen. *MasterWriter* booted to its main menu, but crashed at the first command from that menu. And finally, The Other Guy's own *OmegaFile* crashed on loading. I don't have access to the hardware to try it, but I suspect that like *Sidekick*, *CoCo Windows* can be loaded and used successfully in the next upper bank of a 128K RAM machine.

In any event, *CoCo Windows* is a well-programmed piece of software. In spite of the hardware limitations, it is useful even on a 64K machine, much more so on a 128K, and well worth its very modest price.

(The Other Guy's Software, P.O. Box H, 55 N. Main, Logan, UT 84351, disk or tape $19.95 plus $2.50 S/H)

— John Ogasapian

See You at RAINBOWfest-Chicago May 23-25

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Software Review

S.O.S. to the Programmer's Rescue

By Donald L. McGarry

CoCo has grown up; I'm sure of it. It must have. Another disk operating system (DOS) has arrived for it and this one is special. CoCo can now operate under a variety of DOSs, and a sure sign of a mature machine with a mature group of users is a variety of disk operating systems, each suited to a set of specific jobs. Computers function with only one DOS, but no DOS is perfect for all situations and Disk Extended BASIC is no exception. Even if you aren't interested in learning the ins and outs of a new DOS, read on. *S.O.S.* from Soistmann Enterprises has something for almost everyone.

S.O.S. runs only on a CoCo with 64K and Disk Extended BASIC. J & M disk controllers are OK. It doesn't support BASIC; it is designed to run machine language programs only. It has no built-in tape routines, so it must be used with disk drives. It can handle up to four physical drives. The drives can be 35-, 40- or 80-track, any standard step rate, single- or double-sided. These drives can be intermixed in any combination with no problem. This is a boon to those of us who invested in high performance double-sided drives hoping that one day they would be fully supported.

S.O.S. also handles all screen, keyboard and printer functions. In fact, after *S.O.S.* is configured and installed for a system, it runs in 64K mode and doesn't make use of the ROMs at all. Printer options include any combination of line feed and carriage return, seven or eight data bits, and any standard Baud rate. Those with expanded keyboards have the ability to use the extra keys as well as a control key. The keyboard drivers also provide automatic key repeat. There are many more enhancements and options, but I think you get the point. *S.O.S.* can be configured to take fullest advantage of almost any CoCo system no matter what goodies have been added.

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Since there are other DOSs available, there must be a reason for *S.O.S.* and a reason for my enthusiasm about it. Compared to Disk Extended BASIC, *S.O.S.* is like a gold mine to machine language programmers. Disk BASIC officially supports only one rather low-level system call. Any program written to run under it must use only this call or risk incompatibility with past and future releases from Radio Shack. *S.O.S.*, on the other hand, supports at least 90 documented system calls. Some of these are simple, such as a call to wait a fixed amount of time; others are complex, such as finding a filename in a directory and returning with its location. Writing machine language programs under *S.O.S.* is infinitely simpler and less bug-prone than writing programs under Disk Extended BASIC.

Before going on I should point out that other DOSs, such as OS-9, have large numbers of documented system calls. *S.O.S.* has one big advantage over most of these, especially OS-9. *S.O.S.* is small. With three files open, *S.O.S.* leaves 54,000 bytes open to the programmer. This is much more room than OS-9 leaves for programs and data.

No matter how complete the set of system calls, a DOS is no more useful to the average user than the programs that can run under it. If *S.O.S.* was only an operating system for machine language programmers, it would be some time before a large number of user programs became available. Soistmann Enterprises has been smart in this respect. They have patches already available for some of the most popular CoCo programs. That means users can have the advantages offered by *S.O.S.* without having to write or modify programs on their own. Currently, Computerware's *Editor* and *Macro Assembler*, Micro Works' *Editor/Assembler* and *Disassembler*, Duggers Growing System's *"C" Version 1.2*, Elite Software's *Elite*Word*, Double Density's *Clrterm Versions 3.3* and *4.1* and Cognitec's *Telewriter-64* all have patch files available for them. Patches for Radio Shack's *Disk Scripsit* and *Disk EDTASM* are in the works.

If you own and regularly use one of these programs you really have no need to read ahead. *S.O.S.* offers you increased space using any of these programs and it is probably worth purchasing for that reason alone. If you have disk drives that are capable of using more than 35 tracks and/or stepping from track to track faster than 30 milliseconds, you will have these capabilities using *S.O.S.*

I only have access to *Telewriter-64*, therefore I only tried and tested one patch program. The installation was smooth and simple and left me with about 38,000 bytes of free space. That, in addition to being able to use the additional storage capacity of my 40-track double-sided drives, makes *S.O.S.* seem like a worthwhile investment. The *S.O.S.* patch changes very little of *Telewriter-64*'s operation. You can even use *Telepatch* from Spectrum Projects with the *S.O.S.* version. I can assume by the clear instructions that other patches would be just as simple to install and use.

Soistmann Enterprises includes three utility programs that are necessary no matter how you choose to use *S.O.S.* *Format* allows you to format new disks for use under *S.O.S.* and is necessary for formatting any type of disk that Disk

Extended BASIC cannot format, such as double-sided disks or 40- or 80-track disks. *Backup* allows backing up one disk to another one, which has been formatted the same way. *Copy* can copy files from one drive to another and includes two wild card characters. One can represent any single letter and the other can represent any group of letters. The use of wild card characters makes backing up one disk to a differently formatted disk a breeze. All three of these programs worked exactly as expected and as described in the user's manual.

Installation of *S.O.S.* can be somewhat tedious, but it shouldn't take more than a few tries to set things up the way you want them. Again, the manual is clearly written and explains everything in detail. The only problem is that there are many options. I had a hard time at first deciding on some of them. This really isn't a problem. The whole procedure doesn't take more than a few minutes, so if things don't work out exactly right the first time it is a simple matter to try again. The *S.O.S.* master disk is not copy-protected. In fact, the manual warns that the master should be used only to make backup copies and should never be altered.

Once installed, you enter *S.O.S.* by inserting your customized master in Drive 0 and typing `RUN "SOS"`. This brings up the date entry request. *S.O.S.* dates all files and displays their date when it displays a directory. After entering the date, you are in the main command screen. From this screen you can enter any of the 20 available commands. Each of these is explained in detail in the user's manual. CL closes one or all open files. DC allows you to enter the current date. DD changes the default drive number. DI displays a directory of all files on a disk. The directory display doesn't scroll, so you can read it easily. The data is displayed next to each dated file. DL loads a contiguous block of data from disk to an address that you supply. This method is somewhat faster than loading a program. DM allows you to view and change memory locations. The display shows the address and the byte at that address as well as the four preceding and four following bytes. DS saves a contiguous block of data to disk. It is most useful in conjunction with DL. EX allows you to execute a machine language program at the address you supply. FG displays the number of free granules on the drive selected. FI allows you to change the number of files that can be open at one time. The maximum number of open files is 15. LO loads a machine language program from disk. OP opens a disk file for access as a direct, input or output file. PE prints a description of the current error. PP toggles the parallel print command on or off. When parallel print is on, all characters sent to the screen are also sent to the printer. RB exits *S.O.S.* and returns to BASIC. RE renames a file. RU loads and executes a machine language program from disk. SA saves a machine language program to disk. SA allows saving a program that is not contiguous. ZM places zeros in all user RAM. Many of the system calls duplicate or partially duplicate these commands. This allows you to try a series of commands before coding a program to execute them.

Since there are so many system calls, I couldn't possibly have tried and tested all of them. I did try a few in relatively simple programs just to get the feel of programming under *S.O.S.* The available calls tremendously reduce the amount of work a machine language programmer has to put in. Without *S.O.S.* even the simplest of programs requiring disk access are difficult to write. Using *S.O.S.* I was able to put together working programs in a fraction of the time it would have taken under Disk Extended BASIC.

Soistmann Enterprises seems to have anticipated many needs. There is a system call to do nearly anything that is complicated or complex involving screen, printer or disk access. Some of the calls, although not necessary, are awfully handy, such as the ability to scroll a portion of the screen or to clear the keyboard roll-over table before getting a keypress. I won't even attempt to list the available calls; there are too many. If you are interested, Soistmann Enterprises offers a programmer's reference manual that lists and describes all of the system calls as well as all of the system variables. This volume is a necessity for those who plan to write programs to operate under *S.O.S.*

Overall, I am very impressed with *S.O.S.* for each of its uses. The program works, the authors support their work and are willing to address problems, the manuals are well-written, readable and informative, and the program patches are available for the right programs. I wholeheartedly recommend *S.O.S.* to anyone who can use one of the available patches. I also recommend it to anyone interested in writing machine language programs for their own use or modifying existing programs to operate under *S.O.S.* I'm not yet sure whether I can be quite so enthusiastic in recommending it to those who write commercially.

Soistmann Enterprises has put themselves in an odd position. If *S.O.S.* sells well and becomes widespread it will be an excellent system for which to write. It is certain to remain easier and faster to develop a program under *S.O.S.* than Disk Extended BASIC. But in order to sell in large volume, *S.O.S.* must offer purchasers a system that can run a wide variety of software. I hope the available patches start the ball rolling for *S.O.S.* because I believe it deserves to sell. If programs that run under *S.O.S.* are easier and faster to develop, we all may see more high quality, inexpensive programs available to us. This would benefit the entire CoCo Community.

(Soistmann Enterprises, Inc., P.O. Box 257, Budd Lake, NJ 07828 and P.O. Box 330, West Berlin, NJ 08091, disk $49.95 plus $3 S/H. Price includes user's manual and one patch; additional patches $9.95.)

One-Liner Contest Winner . . .

This program draws a comet on the `PMODE4` screen. It takes a minute or so to complete, so be patient.

The listing:

```
4 PMODE 3,1:PCLS3:SCREEN1,0:FORX
=0 TO 32000 STEP29:Y=50+X^1.5/50
000 +(40-X/820)*SIN(X/57):H=X/13
0:PSET(H,Y,2):NEXT:FORR=1TO5:CIR
CLE(248,166),R,4:NEXT:FORQ=1TO1E
+8:NEXT
```

George R. Furman
Glenham, NY

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Adventures* and its companion *The Second Rainbow Adventures Tape*.)

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See reviews in:
July '84 Rainbow, Oct. '84 Hot CoCo

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Written by: Michael W. Shawaluk
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Book Review

Introduction to Computer Math Sums it All Up

"I hate math, but this makes it seem easy." That is what a confirmed math hater said after looking at the first chapter of this textbook.

Introduction to Computer Math sounds like it should be chock full of Boolean algebra, network analysis and nice exciting algorithms, but it is actually a high school or non-technical college level text that teaches math and BASIC programming techniques.

As someone who briefly taught math at the college level and who has studied a great deal of math (up to tensor analysis, would you believe?), I have worked with many texts and *Introduction to Computer Math* is one of the few "easy" ones I have seen.

I've found that most people who hate math feel that way because of "hard" textbooks. "Hard" isn't a function of the complexity of the subject being taught, but rather the quality of the writing. I have seen new-math books given to third graders that I found confusing, yet in high school I found a text on quantum mechanics that made differential equations seem easy.

Introduction to Computer Math is one such "easy" book. This is a math book that uses computers to do a lot of the dirty work and at the same time shows students how computers are used to solve problems in the real world.

The author develops programming concepts in step with mathematics subjects, taking a student from compound interest, flow charts, and sorting to number theory and geometry, along the way bringing in Jonathan Swift, the Super Bowl (probability) and Schiaparelli (the Martian Canals).

I don't think this book could be used by a student without regular access to a computer, but I do think a motivated student with this book and a computer could go far without a teacher.

This book fits in closely with a currently popular approach to "computer literacy," where educators are no longer aiming at teaching students to *use* computers, but are using computers as an aid in teaching much as books and films are used.

In summary, *Introduction to Computer Math* is a combination math-programming textbook that should lead any computer-oriented child (or adult) to an easy understanding of math concepts and make learning math much easier for the many others who haven't used computers before.

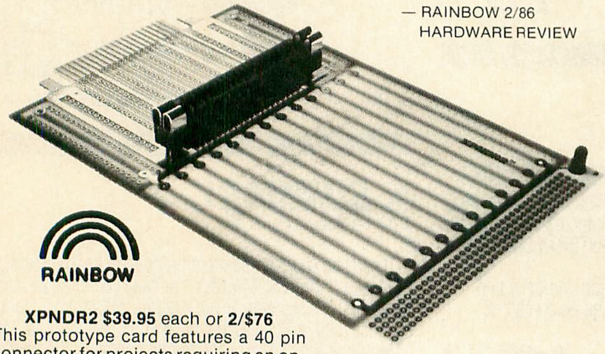
This book also provides a good introductory text for learning the BASIC language for implementation on any computer.

It was books like this, when I was lucky enough to get one between all those obtuse, boring books I normally had to use, that kept me going through the years of school.

Introduction to Computer Math also gives a clear introduction to one of the most misunderstood math subjects, probability theory, and in general presents all its topics in an interesting and humorous manner.

(Russell Merris, Ph.D, Computer Science Press, Inc., 1803 Research Blvd., Rockville, MD 20850, student's text: ISBN 0-88175-083-2, $27.95; teacher's edition: ISBN 0-88175-112-X, $32.95)

— John McCormick



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— RAINBOW 2/86
HARDWARE REVIEW

RAINBOW

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One-Liner Contest Winner . . .

Run this listing to find the distance and midpoint between two points on a graph.

The listing:

```
5 CLS:INPUT"X1=";A:INPUT"Y1=";B:
INPUT"X2=";C:INPUT"Y2=";D:X=(A+C
)/2:Y=(B+D)/2:XX=(A-C)*(A-C):YY=
(B-D)*(B-D):D=(XX+YY):PRINT"THE
DISTANCE BETWEEN THE POINTS IS:"
SQR(D):PRINT"THE COORDINATES OF
THE MIDPOINT IS: X="X"Y="Y:INPUT
"AGAIN";H$:IFH$="Y"THENGOTO
```

Craig Simms
Brasher Falls, NY

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Adventures* and its companion *The Second Rainbow Adventures Tape*.)

Pro Golf —
A Swinger's Toy

After a month on "tour" with *Pro Golf*, this reviewer is among the walking wounded! Both my pride and my trigger finger are slightly out of joint. I don't know how the program author knew in advance about my slice, but he sure had me thinking about taking up needlepoint!

The object of my frustration is the newly released *Pro Golf* game written by John Sandberg and released by Computerware. Please understand the frustration is directed at the way I played the game and not this program. The program can humble most any golfer with very realistic course layout and club action.

To play, the buyer needs to have at least 32K, Extended BASIC, one disk drive and one joystick. The game comes on two copy-protected disks and can be played by one, two, three or four at a time with each player able to declare if they play right- or left-handed.

The disk with the first 18 holes has the actual game on it and the second disk holds another 18-hole course plus a program that allows the user to view the individual holes on screen before playing them. Loading either program is handled by a simple `RUN "GOLF"` or `"SEEHOLES"` from the proper disk to get started.

John Sandberg has both courses laid out in a very realistic manner. Course one is 6,378 yards long, par 70, and the second course is 6,714 yards long, par 72. Lakes and rivers, sand traps, rough, heavy rough, trees and out-of-bounds areas all have their own color pattern, which, after a little time, seem very natural. Oh yes, there are fairways, but somehow I didn't use them much (just like the way I play a real course. That darn slice!). As in a real golf game, club selection, ball lie, aim, swing and wind affect the ball's travel. The player's skill in adjusting to conditions determines, for the most part, the outcome. For example, should the player hit the ball in among the trees, it cannot be blasted out or flown over the trees. The ball must be played around the trees. Likewise, hitting out of bounds requires a replay from same location and a two-stroke penalty. A water hazard requires a replay from the same location and a one-stroke penalty (while this may not be the way the official rules require, it is practical). But at least you don't lose a ball.

When the player has arrived within range to chip or lands on the green, the program automatically draws a full enlargement of the green and the surrounding area. At that point, the player off the green has his/her club selected by the program (pitching wedge), and once on the green, the putter is automatically selected.

Just before a hole is displayed, the player is reminded of the yardage and par for the hole. After completing a hole, the score card is displayed, the score is updated and the number of strokes over par is posted.

This program follows very closely the real world for play and scoring and even provides an opportunity to use the driving range or a putting green. The manual is complete and explains the ground rules. The only problems are the method required to swing the club and what appears to be some random decisions by the program on the results of that swing. To swing the club, the joystick is centered and moved to the rear (away from the firebutton), then it must be flicked, slapped or batted with a finger (or pencil, etc.) trying for speed not force (the reason my finger was slightly out of joint). The objective is to move the joystick from the back to front center as fast as possible.

The result of the flick determines, according to the manual, if the hit is a slice or a hook, short, or a short slice or short hook. However, on several attempts, the program would tell me it was "Nice Shot!", but the ball would turn out to be a slice (and maybe even go out of bounds). On the green during one round, the ball went into the hole (the program posted that fact) and then it noted it was "Out of Bounds! Try Again." I had to keep putting until I reached the 17 strokes maximum allowed for each hole. Granted, it only happened once, but with what appears to be the random decisions by the program, you can't win. Anyway, maybe I have time for just one more round before I take up needlepoint. Fore!

(Computerware, P.O. Box 668, 4403 Manchester Ave. Suite 102, Encinitas, CA 92024, disk $29.95 plus $2 S/H)

— Robert E. Foiles

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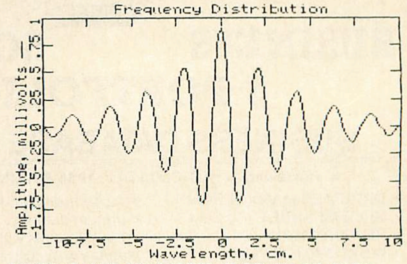

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Double RAM Brings 512K to CoCo

The new ME-14T Double RAM is an expansion to the *Thunder RAM* board offered by Spectrum Projects. This upgrade expands CoCo to 512K of onboard RAM.

Double RAM consists of a 40-pin socket, a switch and eight 256K chips. Installation is simpler than the installation of *Thunder RAM*. Simply remove the 256K *Thunder RAM* chips already in your computer and plug in the new chip/socket combinations. After this, you will re-install the original 256K chips piggyback style. Also, you must remove the SAM chip and perform the same process on it. Finally, install the bank select switch and you are ready to go.

Use of Double RAM is fairly simple. When you wish to work in Bank 1, just set the switch to position one. You must flip the switch to enter Bank 2. This is an important point. Your CoCo will not have a contiguous 512K. Double RAM configures the computer to have two separate 256K banks, each accessing TDOS in the same way. It is as though you had installed two separate *Thunder RAM* boards as there is no logical connection between the two banks. Data cannot be transferred from one bank to the other.

At first, I considered the two separate banks to be a drawback to Double RAM. Who wants two unconnected halves of 512K? This approach, however, does allow some flexibility. Now it is possible to have 30 graphics pages in one bank and a *Ramdisk* in the other, or one could simply choose to have two distinct *Ramdisks*. All functions and capabilities that apply to *Thunder RAM* apply to Double RAM as well.

The manually-switched bank approach does introduce a somewhat frustrating problem, however. Once Bank 1 is enabled, the other bank is effectively out of the system. The data it contains is still intact, but you have to throw the switch to enable it, thereby disabling Bank 1. The two banks cannot communicate with each other. It would have been nice to have a replacement ROM with the unit that would allow software control over which bank was being accessed.

The installation instructions in the documentation are clear, concise and easy to follow. The operation section, however, is somewhat misleading. It reads " . . . you can transfer a program from one bank to the other by loading it into the computer, switching banks, and then saving it to the second memory bank." This proved to be impossible. If you load a program into Bank 1 and switch banks, there is no way to access the program. It has been switched out of the system. The memory of the computer is the bank that has been switched out. The manufacturer has assured me that this statement has been removed from the documentation.

I was able to use the two 256K banks under both Disk BASIC and OS-9. Although theoretically possible, I was unable to run Disk BASIC in one bank while booting OS-9 in the other. I'm going to keep trying on that one.

Despite my frustration with the awkward design approach, I could see Double RAM's potential. Due to its requirement of *Thunder RAM* and, consequently, a 'D', 'E' or 'F' board CoCo, I don't feel it will become a standard for the CoCo. It does, however, have a place in the CoCo world. I don't know of too many Color Computer programs requiring more than 256K of memory, but in my book, Double RAM scores a 7½ on a 10 scale.

(Spectrum Projects, Inc., P.O. Box 21272, 93-15 86th Drive, Woodhaven, NY 11421, $79.95 plus $3 S/H)

— Cray Augsburg

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One-Liner Contest Winner . . .

Ever heard of the "magic 8-ball"? Just run this program, ask a question of yourself and press the ENTER key to find the answer.

The listing:

```
10 CLS0:PRINT@229,"PRESS <ENTER>
 FOR ANSWER";:EXEC44539:A$(1)="A
SK ME LATER":A$(2)="FORGET IT":A
$(3)="YES":A$(4)="NO":A$(5)="IT
IS CERTAIN":A$(6)="IT IS DOUBTFU
L":X=RND(-TIMER):X=RND(6):CLS0:P
RINT@233,A$(X);:SOUND150,3:FORT=
1TO999:NEXT:GOTO10
```

Bruce Gerst
Omaha, NE

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Adventures* and its companion *The Second Rainbow Adventures Tape.*)

The Enhancer 6.0 — Improved and Versatile

This latest Version 6.0 of *The Enhancer* is quite impressive. The biggest improvement from previous versions is the ability to save and recall redefined characters and keys. It requires 64K Extended BASIC and can be loaded from tape or disk, although the disk version contains several demonstration programs not available on the tape version. *The Enhancer* resides above Disk BASIC leaving everything else for BASIC. It also provides the capability to display text and graphics on a `PMODE 4` screen in 32 columns by 24 rows. The text provides for true lowercase, but the descenders do not drop down below the base line. This is not objectionable to me but may be to some people. The Hi-Res screen text characters are well-formed and easy to read.

Once *The Enhancer* is loaded and executed it provides many new commands such as:

Recover	— lets you recover a program erased with `NEW`.
Break	— disable/enable the break key.
Scroll	— lets you freeze a specified portion of the screen while the rest scrolls.
Custom	— allows you to create your own custom graphics or text character.
Keydef	— lets you define any of the alpha keys for any string or function. Default values are already set up in the program.
Despace	— eliminates all spaces in your BASIC program except those enclosed in quotation marks.
Repeat	— provides auto-key repeat after a ½ second delay.
Cursor	— allows cursor positioning on the Hi-Res screen much like `PRINT@` in BASIC.
Swap	— lets you swap either string or numeric variables.
Char	— lets you determine the value of a character at a specified position on the Hi-Res screen.

All of the commands worked fine and were fun to experiment with. I was particularly impressed with the Custom and Scroll commands. The ability to create my own character set and save it for later recall was a treat, and the Scroll command let me lock any block of the 24 lines on the Hi-Res screen, thus keeping the frozen portion of my graphics intact.

There are a couple of new functions added, too. However, their use is above my head. Using the documentation as a guide they are:

Eval	— lets you evaluate the value of string$ as compared to `VAL` in BASIC for actual numbers.
Procedure	— provides the ability to perform specified tasks.
Push and Pop	— allows numeric values to be pushed and pulled from a stack.

Documentation is ample. *The Enhancer* comes with 20 pages covering everything you need to know to use the software. It's well-done and even contains information on using *The Enhancer* in machine language programs.

My only objection to *The Enhancer* is that it is copy-protected. While H.D.R. will replace your damaged disk or tape for only $1, I don't believe that's much consolation if you have lost a favorite program, even temporarily. I'm a firm believer in backup copies and the thought of not having a backup of some of my favorite programs makes me nervous. If nothing else, I would like to see the package cost a little more and contain a tape backup.

I believe *The Enhancer 6.0* is worth the price. It lives up to its name and won't leave you disappointed.

(H.D.R. Software, 27 Doyle St., St. John's Newfoundland, Canada A1E 2N9, $18)

— Jerry Semones

Hint . . .

Cassette Motor Control

If you want to switch external devices on and off under computer control, the cassette remote control (the smaller gray plug on the cassette cable) is a good way to do it. It's best to use the CoCo's relay to key another relay whose contacts can handle the load you intend to switch.

In many cases (such as telephone pulse dialing) the `MOTOR ON` and `OFF` commands work too slowly. You can use `POKE 65313, 4` to switch the motor on and `POKE 65313, 52` to switch it off.

Canadians

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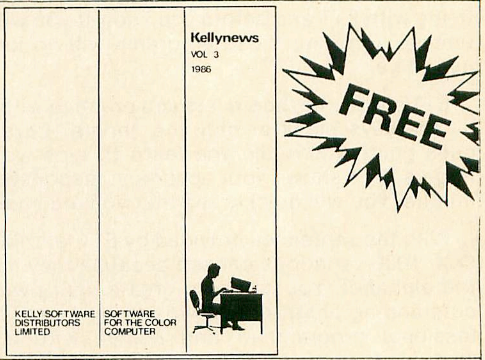
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FORMAKER Provides Clean Paperwork for Businesses

By Dennis A. Church

Many people establish small businesses, sometimes in their own homes, and those who have tried have undoubtedly discovered two things. You have to look good to the customer and it costs a lot to look good. This program helps in both areas by providing neat, well-prepared forms for a modest price.

As the name states, *FORMAKER*'s primary purpose is to generate forms for the small business. These include invoices, mail orders, purchase orders, receipts, order confirmations, payment notes, overdue invoices and job quotes. It comes on a single disk with 15 pages of written instructions for a 32K CoCo and an 80-column printer. Although there are some quirks to loading, everything worked fine when I followed the instructions.

Accessing the program's features is a matter of choosing from a series of menus. In general, the input routines from the menus are goof-proof, although the BREAK key is not disabled. There are two main divisions to the program, each having four menus for making selections. The set-up procedure for printing any of these forms can be quite involved. The most efficient use for this program is when a number of forms need to be run or recorded or as a program to use a CoCo as a work station throughout the day.

Setting up *FORMAKER* requires first running the program *PCLEAR0* in order to free up the memory from the graphics pages. Then the *Customizer* program must be run either directly or from the core program: *F/BAS*. The *Customizer* program stores the company name and address and special printer codes. It also stores a second set of names and codes that can be used, for instance, if you want to use the forms for personal orders or letters.

As I said, the core program is *F/BAS*. Entry of customer/vendor information includes naming "to the attention of" and "from whom ordered." One aspect that may present a problem is that no provision is made for a four-line address. From *F/BAS*, select the type of form you want to print. Then the prompts ask for the quantity, description and cost of each item. A running total is on the screen throughout. At any time during item entry you may save the list to disk, see the subtotal, cancel the last item for re-entry, return to the menu and even insert items that have been previously stored in a subquote disk file. The option to cancel the last entry, however, is not presented onscreen. I discovered it in the documentation. It worked as advertised. When item entry is completed, a series of questions asks for tax rate, discounts, type of payment or account, shipping method, shipping cost and deposit as well as the customer tax number. When an item does not apply, pressing ENTER bypasses it for the printout.

FORMAKER uses either one or two disk drives. With two drives, the data disk is kept in Drive 0, which is unusual. Getting started with the program in Drive 1 requires attention to disk loading syntax, but once startup is accomplished, the program handles the two drives well.

The printer menu is extensive. When setting up the program with the customizer, you need to include the printer codes for form feed, emphasized print and regular print since these options are available on the print menu. In practice, other things can happen by using other codes. I preferred choosing between condensed and regular print and I accomplished that by using the printer codes for condensed print when asked for emphasized codes.

Before choosing the "print single copy" option, menu items can adjust the printout to print multiple copies, to omit the return address (if you are using a letterhead), to arrange the printout for either window envelope or no envelope and to print the envelope address for the form.

E.T.T. Electronic Typing Teacher
by CHERRYSoft

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Hint . . .

DMP-105 Ribbons

The cartridge ribbon for the Tandy DMP-105 printer is apparently only available from Radio Shack. Ribbon life is rated at one-million characters, but this can easily be extended two- or three-fold.

Gently pry off the top cover of the cartridge and invert the large foam ink wheel. The constant re-inking process can be further enhanced by putting a few drops of matrix printer ink on the foam.

Melvin L. Mauck
Lexington, VA

You can also print subquotes (a disk-stored item list) on separate sheets of paper, which causes a pause until you advance or change paper in the printer. There is no option accessible within the program, however, to change the Baud rate, which is 600.

All these options work fine to produce forms that are 70 characters across. There are no fancy graphics or logos, but the forms are well-organized and clear and contain the information you have included without items that don't pertain. For example, if you do not indicate a customer tax number, there will be no line referring to it.

Another type of form the program generates is the standard business letter. Text is entered by selecting a "notes" or "letter" option. This program module allows the entry of up to 40 lines of 70 characters each. It is essentially a limited line-oriented text processor. Lines can be reviewed, but you must re-enter an entire line to change anything within the line. These notes may be saved to disk for retrieval any time or used immediately for printing. Lines from this module may also be attached to any form available, which makes it easy for invoices, mail orders, etc., to carry specific messages from your business such as "avoid broken bones, pay your bills promptly."

A strategy for entering the lines when writing a letter is to make each line as close to the same length as possible because each is printed as an entire line, blank lines and spaces included.

FORMAKER comes with 15 pages of documentation. It is well-organized and clear, especially on the use of the *Customizer* program, which is the first step to effective use of *FORMAKER*. There are an additional 15 pages of documentation in a disk file named *FHELP*. This information is available at any menu page as on-screen help. Press '?' at any menu item; that item is then explained. As convenient as this sounds, I recommend that you first run *PHELP*, a program that prints out the pages to the printer. Selecting on-screen help causes the disk drive to churn quite a long time. When the text-help comes to the screen, it is obvious that the formatting was done to accommodate the printout. Lowercase letters create a checkerboard and words are broken at line's end indiscriminately.

This is not to say that I find fault with this documentation. The printout is well-organized by topics with numbered pages. It complements the written documentation by providing a reference for the features and functions of the program.

As mentioned before, I don't think this is a program you boot up if you just want to order a 64K RAM button from Spectrum Projects. The loading procedure is rather involved. If you are going to bill a dozen customers with personal notes attached, however, I can't think of a better program. It is especially useful if you need to prepare a variety of forms at the same time. Switching from mail order to overdue invoice, for instance, is just two menu choices away. This program would make a CoCo and printer an ideal work station to be used like a cash register most of the time and to send bills, etc., at the close of the day. It will give the small or home business professional-looking forms and effortless, errorless totals, accounting for taxes, discounts, shipping and deposits.

(Challenger Software, 42 4th Street, Pennsburg, PA 18073, 32K ECB, disk $49)

Software Review

Tracking Radio Contacts is Easy with *Radiolog*

Radiolog is a handy program for the amateur radio operator. It can be used to keep track of stations worked by either date or call sign. Provision is made after each entry to add up to 23 extra characters as remarks. This is useful to log contest exchanges, signal strength, frequency, etc.

This electronic logbook is supplied on a single diskette under three filenames: *Log/Bas*, used for a single drive system; *Radiolog/5*, used with a two-drive system (reads Drive 0 and 1 and writes to Drive 1 only) to be used when the disk in Drive 0 is full; and *Conv/Bas*, which converts the *Radiolog* program to read all the data on Drive 0 and Drive 1, then begins entering data on Drive 1.

With a single drive system you can store about 2,500 QSOs (two-way contacts) while 5,500 are possible with a two-drive system, which is ample contact storage for even the most active operator.

The program is menu driven and very easy to use. It's also very fast in its search mode judging from the 50 or so test entries I made. The main menu provides the routine to enter, edit, and list your logbook information.

A SEARCH/EDIT function will find any call sign you have entered with the opportunity to continue searching for the same station or to look for another. This is a very important feature for contest operators who must search for and delete duplicate contacts. Editing is just as simple by pressing 'E' and re-entering corrected information if the need arises.

The nicest feature by far, in my opinion, is the printer capability. You can print out your logbook entries by date or call sign. I used it with my Gemini-10X and got very nice looking pages suitable for storage in a three-ring binder.

The package consists of a single diskette that can be backed up for your own use and four pages of printed instructions. Also included is a "code plug." This is a modified plug that fits into the right joystick socket and must be in place for proper program operation.

So, Hams, take heart! Here is an inexpensive way for your computer to help out in the shack. Now you can clear the operating position of all those dog-eared logsheets and let CoCo keep track of your contacts.

(Sunrise Software, 8901 NW 26 St., Sunrise FL 33322, $9.95)

— David Gerald

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26 Hardware Projects Offers Challenges for the Advanced

Are you a serious electronics hobbyist? Do you like to construct small electronic circuits? Do you wonder how you can interface your computer with the outside world? If your answer is "yes" to these questions, do I have a review for you!

26 Hardware Projects for the Home Computer is a book of electronic circuits dealing with devices you can build to interface with your computer. The introduction states, ". . . it is assumed that the reader knows the rudiments of soldering, the handling of CMOS chips, and the use of an oscilloscope." After looking at some of the circuits in this book, I suggest that the user know what he is doing since some of these circuits are very complicated.

With that warning out of the way, let's get started. There are 26 projects in this book and they are broken down into three categories: 1) Input/output devices, 2) Output devices and 3) Input devices. Input devices allow information or data to be entered into your computer from external devices such as a keyboard, cassette or disk drive. Output devices allow information or data to be sent from the computer to an external device such as a monitor or a printer. Input/Output devices combine both of the preceeding operations.

Let's examine some of the individual projects included in each of the categories listed.

BASIC COMPILER

WASATCHWARE believes that users of the Color Computer deserve the right to use all 64k of RAM that is available in the computer, and have fast machine language programs that use the full potential of the 6809 microprocessor. That is why the BASIC compiler, called MLBASIC was developed. Here are some of the reasons that make this compiler one of the best bargains in this magazine:

- Programs can use all 64k of RAM for either program storage or for large numbers of variables and arrays like A(20000)
- Full Floating Point arithmetic expressions with functions
- SUBROUTINE and CALL commands allows for structured programming and more independent program development
- Full sequential and direct access disk files allowed
- BASIC source and M.L. output I/O to disk, tape or memory

COMMANDS SUPPORTED

1. I/O -Commands
CLOSE CLOADM CSAVEM DIR DRIVE DSKI$
DSKO$ FIELD FILES GET INPUT KILL
LSET OPEN PRINT PUT RSET

2. Program Control Commands
CALL END EXEC FOR STEP NEXT
GOSUB GOTO IF THEN ELSE ERROR
ON..GO RETURN STOP SUBROUTINE

3. Math Functions
ABS ASC ATN COS CVN EOF
EXP FIX INSTR INT LEN LOG
LOC LOF PEEK POINT PPOINT RND
SGN SIN SQR TAN TIMER VAL

4. String Functions
CHR$ INKEY$ LEFT$ MID$ MKN$ RIGHT$
STR$ STRING$

5. Graphic/Sound Commands
COLOR CLS CIRCLE DRAW LINE PAINT
PCLEAR PCLS PLAY PMODE PRESET PSET
RESET SCREEN SET SOUND

6. Other/Special Commands
DATA DIM LLIST MOTOR POKE READ
REM RESTORE RUN TAB VERIFY DLD
DST IBSHFT LREG PCOPY PMODD PTV
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Input/Output Devices — Peripheral Interface Adapter (PIA). The PIA exchanges data with a peripheral under the direction of the central processing unit. A peripheral is a unit of processing equipment that is outside of the computer, such as a keyboard, monitor, cassette player or disk drive. Now we'll see how this process works.

The PIA has eight data pins that are used for exchanging information with the central processing unit. It also has 16 peripheral data pins that are used for sending or receiving data to and from peripherals. Each peripheral data pin can be used as an input or an output, but not both at the same time.

Let's say you type a math problem on the keyboard. This information is sent to the central processing unit via the PIA. The CPU then acts on this information (figuring out the problem) and generates the answer again through the PIA to an output device such as the monitor where you see the results of the problem printed on the screen.

In our example above, the keyboard is connected as an input, through the appropriate interface circuitry, to the peripheral data pins. The monitor is connected as an output, again through the appropriate interface circuitry, to the other peripheral data pins. With these two devices connected in this way to the PIA, you are able to type something onto the keyboard and to see what is typed on the monitor.

Output Devices — 7475 Data Latch. As the name suggests, this project is used to latch onto the data as it comes from the data bus. This is necessary because the information on the data bus is only on the bus for a couple hundred nanoseconds. With this project, the latch output stays constant until more data is entered.

The timing of the data strobe is very important because it controls when the data disappears from the input. Each of these chips can handle four bits at a time, so you need to use two chips for an eight-bit data bus.

Input Devices — I chose the Electronic Sketcher as the last project I will talk about. This is a very simple circuit that requires the use of three resistors, a +2.5 voltage and the use of one of the joystick inputs to connect it to your CoCo.

This circuit works by putting dots on the computer screen with the use of two 10K pots, which control the location that the dots are seen on the screen. These pots can be labeled the 'X' and 'Y' inputs. The screen is broken down into rows (X axis) and columns (Y axis).

You use the joystick as the input from this circuit since this is an analog-to-digital converter. When you turn the 10K pots, it is considered an analog (continuous) movement. This analog movement must be converted into a voltage the computer understands, which is digital. The A-to-D converter does this automatically.

You can also hook up a switch to another of the joystick inputs and this allows you to add or erase dots. Thus, you can easily erase your creations.

As mentioned earlier, some of these projects are definitely not for the novice hobbyist. That is why I only presented a thumbnail sketch of how the projects worked.

If you are an experienced hobbyist and would like to have some projects that allow you to interface your CoCo with the outside world, you will find this an interesting book.

(Dan Cross-Cole, 208 N. Abingdon St., Arlington, VA 22201, $5.95)

— John H. Appel

Word Processor Disparity Solved with *CoCo Text Util*

Have you ever downloaded text from your favorite BBS or copied a text file created on a word processor different from the one you use? Have you ever had to edit the text and insert or delete carriage returns to make it look like it's supposed to?

If the answer to either of these questions is yes, then *CoCo Text Util* will solve the problem. This BASIC program from Foxx Software is designed for people who use their CoCo with a word processor to create text files to upload to or download from another system or BBS.

CoCo Text Util reads any ASCII file from disk, modifies it according to user-specified menu options and creates a new file leaving the original file intact. The menu options are:

1) Insert carriage returns
2) Strip carriage returns
3) Strip control characters
4) Convert to all mixed-case
5) Convert to all uppercase
6) Convert to all lowercase
7) Fix *WordStar* files
C) Count file
P) Print file
R) Rename file
K) Kill file
D) Display file
Q) Quit
B) Baud rate

Each of these menu options is self-explanatory but a few deserve further explanation.

VIP Writer and some other word processors do not add a carriage return at the end of a line and problems are likely to occur when trying to upload to a BBS or read the file on another word processor. Since each paragraph is saved as one continuous line, you get a rather cluttered text file on any other word processor. If option one is chosen, the program adds carriage returns at the line length specified and word wrap is enabled. The exact opposite occurs when selecting option two to remove carriage returns. This is needed if using *VIP Writer* to read a text file created with a word processor such as *Telewriter-64*. Control characters can be removed from the file by choosing option three. For example, if *Telewriter-64* files with control codes that are unreadable to *VIP Writer*, it may prevent the file from loading at all.

The commands to convert to upper-, lower- and mixed-case are handy if your printer won't handle lowercase, or if the BBS needs one or the other. The Count File option does just that. It counts and displays the length of the file you are working with. The Print File function prints hard copy of the file at selectable Baud rates up to 2400. I could not check the option that fixes *WordStar* files. However, the author's explanation stated that it corrects these files so they can be used with other popular word processors.

A nice feature is the default extension automatically added by the program. This is a quick and accurate way to determine which files have been corrected when viewing the disk directory. As an example, FILENAME.ICR indicates a file with carriage returns inserted, while FILENAME.AUC indicates all uppercase. The extensions may be modified to your preference as well.

The program is available for disk operation only. It is not copy-protected, so backup copies can be made. A liberal return policy is available from the author, Dave Haber, who will replace the program free of charge if problems develop. The documentation consists of a six-page, spiral-bound booklet that is easy to understand.

I think *CoCo Text Util* will be a hit because it fills a need. It takes a lot of drudgery out of text file editing. The price is right and the return policy can't be beat.

(Spectrum Projects, Inc., P.O. Box 21272, 93-15 86th Drive, Woodhaven, NY 11421, $19.95 plus $3 S/H)

— Jerry Semones

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Library Service *Disk Management System* Worth Checking Out

The *Disk Management System* program, supplied on an unprotected disk, needs 32K memory for all of the options to work, but most of its options work with a 16K system. And work it does!

The program provides a library service for the disk user by storing a copy of the user's disk directories and allocation tables of each of up to 100 disks on a DMS disk. The DMS disk is actually created by the program to function as repository for the eight functional utilities and the disk information. These eight utilities are the heart of the program, but the disk also includes two bonus routines.

The program disk holds a program that creates the disk management system (DMS) disk. The original program disk is used only to create the DMS disk, which then becomes the operating disk. The start-up routine is the most work the user really has to do to in using the program. This routine is set to function on a single disk drive and requires several disk swaps to transfer the necessary programs to the DMS disk.

The DMS disk functions are called into action by selecting the option desired from a colorful main menu. Selecting the first letter of the option is all that is needed to bring up the submenu for that option. However, the first time the program is run, the user is given the opportunity to configure the program to work with in the parameters of his/her system. The number of drives may be changed from the default of one to two, printer Baud rate may be set for the other than default 600, adjustments can be made for whether or not you have an Epson Printer online and whether or not the system operates at "double speed." The question on the Epson printer relates to "skip perforation" subroutine written for the Epson for printouts. The double speed option works with some units and the program author includes a four-line test program in the manual for those users not sure if it is possible on their unit. The double speed option only affects the sort routine and is not a problem to users if their systems do not work at double speed. As noted, this start-up routine need only be done the first time the DMS program is run. After that the user is locked into those specifications.

The major options are: Update Files, Search, Complete Directory Listing, Disk Information, Names of Disks on File, Alphabetize and Print, Restore and Basic.

The Update File option is used to obtain the information to be stored in the library on the DMS disk. As part of this operation, the user is required to provide a name for the disk being read into the library. A name may be up to 32 characters long. The programs or files on the disk are logged in under the disk name and each disk read is given a sequential number. The name and number are used in other options.

The Search option searches through all the data in the library to find the specific name entered. How specifically the search name is entered determines the number of responses. For example, if only `DISK` is entered, programs that have `DISK` in them will be found; `DISK.DAT`, `DISKFLE.BAS` and `EDDISK.BIN` for example. The results of the search can be directed to the screen or printer.

The Complete Directory Listing option produces a printout (either to screen or printer) of all the items in the library.

The Disk Information option gives the user a listing of not only the disk's directory but also of the disk's allocation table. To get this information, the disk is called up by its number. To get the information on the disk and its assigned number, the Names of Disks on File option is used. Again, the listing can be to screen or printer.

The Alphabetize and Print option is available only to users with 32K of memory. If the unit in use can run at double speed, the sort and alphabetize times are reduced. However, the routine is fast enough without double speed. For example, a sample of eight disks with 104 programs took only 12 seconds to sort. After the sort is completed, the names of files are printed out in four columns listing each filename and extension plus the number of the disk it is found on. The names are printed in blocks according to the letter of the alphabet with a blank line between the blocks. The program allows 1,300 names to be sorted.

The Restore option is usable to restore a crashed disk. The saved disk directory and allocation table can be rewritten to a disk that needs such resuscitation. This option is not a stand-alone zap routine, but was designed to work with a disk-zap program. As part of the testing, a disk allocation table (of a saved disk) was altered and then restored with this option.

The Basic option is used to return to BASIC and end the program. As an added feature, this routine closes files and sets the disk drive head to track zero before doing a warm restart.

One of the bonus programs is a *Name* program that allows the user to place names on disks without going through the DMS routine to do so. However, if the disk has already been logged into the DMS library under a different name, it will still be in the file as entered. The other bonus is a *Menu* program. (See Page 214 of the February 1986 issue of RAINBOW for complete description of this program.)

The manual is six single-sided standard pages printed by a dot-matrix printer. All the information necessary to use the program is included and is easy to follow.

(CMD Micro Computer Service Ltd., 10447-124 Street, Edmonton, Alberta, Canada T5N 1R7; distributed in the U.S. by Saguaro Software, P.O. Box 1864, Telleride, CO 81435, disk $19.95 plus $2 S/H)

— Robert E. Foiles

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Programs from Our Past Printer Issues:

May 1985 — *Pictures Perfect*, two screen dumps for small and large printed images; *Number Jacks*, a memory game for preschoolers to adults; *DIRECT*, organizes your tape collection; *Two-Column*, prints program listings in two columns; *Gemini Screen Print*, a screen dump that puts graphics onto paper; *KwikDraw*, a graphics program to incorporate pictures created with drawing utilities into BASIC programs; *Script*, a graphics printer utility that prints in script; *Putting the Okidata ML92 to Work*, printer utilities to provide a simple interface with the CoCo; *Rat Maze*, a two-dimensional maze game; *Formatter*, helps debug and make nice looking listings; *Eye Q*, game to test IQ by solving clues; *Purchase Order*, printer utility sets up purchase orders and records mail orders; plus 14 additional programs.

May 1984 — *Printer Magic*, printer utility to use embedded control codes in BASIC programs; *Address*, disk utility to relocate machine language programs and their addresses; *Color Graphic Banner*, printer utility creates messages in bright color graphics; *Boltype*, a tutorial on dot graphics usage for three new letter print styles; *Mailabel*, prints useful mailing labels; *Postcard Whacker*, prints messages on standard postcards; *CGPLABEL*, a utility to print two-color labels; *GPDUMP*, printer utility creates colorful pictures with the CGP-115 printer/plotter; *Garsale*, a home help garage sale utility program; *Q-Nerd*, an arcade game for fun with Q*Bert's nerdy friends; *Heist*, an alarmingly fun bank robbery game; plus 10 additional programs.

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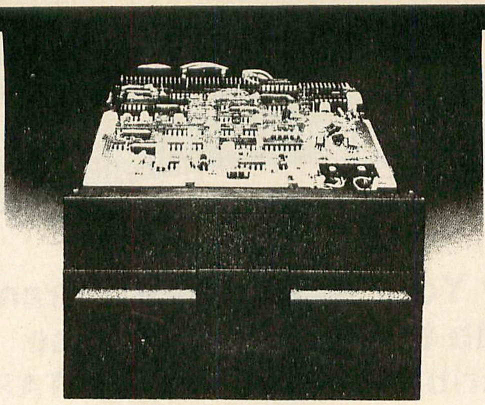

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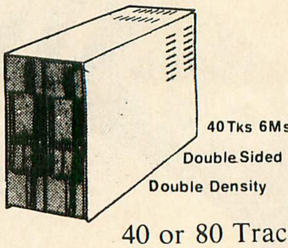

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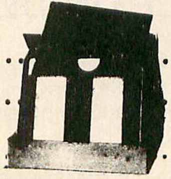

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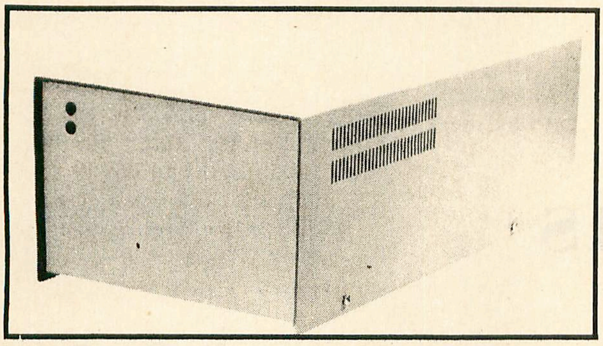

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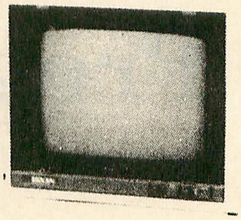

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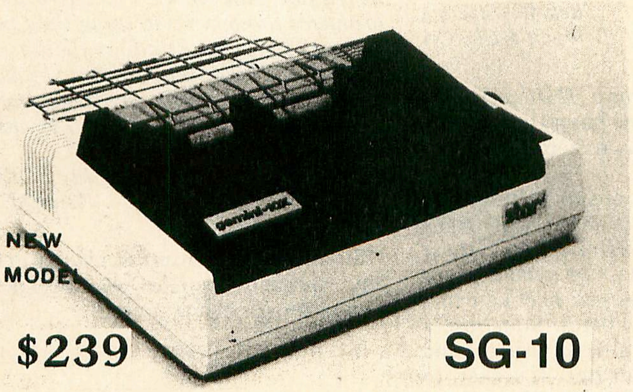

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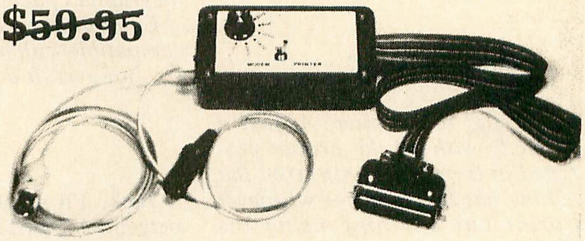

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RAINBOWTECH

DOWNLOADS

Transferring ASCII Programs

By Dan Downard
Rainbow Technical Editor

• *I have recently upgraded to 64K and disk. I also have a Model III with two disk drives and a DWP-410 printer.*

I would like to be able to transfer ASCII programs and data from CoCo to Model III and from Model III to CoCo. Any information on doing this would be appreciated.

Robert L. Burnham
Huntington Beach, CA

Robert, MichTron used to market *C III*, a program that directly transfers ASCII disk files from a CoCo to a Model III, or vice-versa. Write them for more information. I have used the program and it works fine.

Printer Problems?

• *I have a Gemini-10X printer. At first it worked perfectly with all the printer programs I typed in from* THE RAINBOW. *But now something has happened — whenever I try to print out anything using the* `PRINT#-2` *or* `LLIST` *commands all I get is garbage. The printer still works perfectly with* Color Scripsit *but not with anything else. I reset the DIP switches, but that didn't work. I also took my printer over to my friend's house and tried it on his CoCo I; it still didn't work. I was wondering if you could give me some possible suggestions on what might be the problem, and also what the possible correction(s) might be.*

Corey Davis
Winnipeg, Manitoba

Dan Downard is an electrical engineer and has been involved in electronics for 26 years through ham radio (K4KWT). His interest in computers began about seven years ago and he has built several 68XX systems.

Corey, see the next letter.

• *I am writing in response to the question asked by John E. Walsh about the Gemini SG-10 printer ["Downloads," December 1985, Page 256].* Graphicom *may be responsive to the Epson printers but it will not work properly with the Gemini series and* Hardcopy *by Computize will not work at all. I use a Gemini-10X printer and have found that the best for printing graphics and type on graphics pages is* CoCo Max.

Computize advertised that Hardcopy *was compatible with all the Gemini series printers, however, it does not work.*

Jack W. Eizenga
Baldwin Park, CA

Jack, I'll stand behind *Hardcopy* 100 percent. A friend of mine has a Gemini-10X like yours and uses this screen dump program extensively.

After some conversations with Computize we believe there is a problem with some serial-to-parallel converters. Since these converters have to contain an oscillator for the serial output timing, you may be experiencing drift in the oscillator. Some use a simple RC circuit with a fixed resistor, and some have a potentiometer. It's easy to adjust a pot, but difficult with a fixed resistor.

As soon as we find a solution we'll print it, but this brings up a good point. You didn't say what kind of serial-to-parallel interface you are using. It really helps me to know every detail of your system. Lately, I haven't seen too many unmodified CoCos left. Every modification you make may have an effect on something else in your system. I know this doesn't exactly solve your problem, but Computize has had enough complaints that they are making an honest effort to remedy the situation. We're trying to help.

Video Signal Fine with PAL TV

• *You have written that there can be difficulty using a CoCo in Europe only in video signal.*

I have my American CoCo, DMP-105 printer and two disk drives, all bought in the USA on 110, running in Israel with a 220-110 volt AC convertor (300 watt) and a PAL TV. The video output on my standard CoCo works fine with a PAL TV. There are a few problems though. First, using the CoCo on channel 3, you must adjust the horizontal and verticle hold. Without this you have an unusable picture. Also, there is no sound. To remedy the sound problem, I've installed Moreton Bay's Mini Mouth.

Jay Y. Krinsky
Netanya, Israel

It's nice to hear from our readers in Israel, Jay, especially when they have an experience to contribute such as yours.

Early *Telewriter-64* Updated

•*The early* Telewriter-64 *was written for Color* BASIC *1.1. If you try to use it with the* *newer Color BASIC version 1.2 it seems to work, although unreliably and with very slow key response. I've noticed the Color BASIC 1.2 has a different address for POLCAT. Here are the fixes and procedures. These apply only to the first issue tape of* Telewriter-64, *and without disk controller:*

```
 1) Cold start
 2) POKE 25,78:POKE 19968,0:NEW
 3) PMODE4,1:PCLS
 4) PMODE4,5:PCLS
 5) PMODE4,9:PCLS
 6) CLOADM"TW64"
 7) POKE 7932,203
 8) POKE 8208,203
 9) POKE 9729,203
10) POKE 13658,203
11) POKE 14648,203
12) POKE 15116,203
13) CSAVEM"TW64",7720,
    16360,7720
```

Copy this version onto your working Telewriter *tape in place of the original version and you will find the Color BASIC 1.2 performs better than the 1.1 and original* Telewriter-64 *ever did in terms of speed.*

Here are the fixes and procedures for conversion from Color BASIC 1.1 to 1.2 for the original Telewriter-64 *disk. Please note this doesn't fix the Disk BASIC 1.0 to 1.1.*

```
 1) Cold start
 2) POKE 25,86:POKE 22016,0:NEW
 3) PMODE4,1:PCLS
 4) PMODE4,5:PCLS
 5) PMODE4,9:PCLS
 6) LOADM"TW64"
 7) POKE 7932,203
 8) POKE 8211,203
 9) POKE 9846,203
10) POKE 13784,203
11) POKE 14775,203
12) POKE 15242,203
13) SAVEM"TW64/BIN",
    7720,16619,7720
```

Put this on your working copy disk of Telewriter-64 *in place of the original* Telewriter-64.

Don Pihl
Guilford, CT

I guess *Telewriter* is probably the most widely used piece of software for the CoCo, Don, and I'm sure your tips will be welcome. I still use *Telewriter-64* to write this column.

Typewriter Interfacing

• *I am trying to interface my Brother EP44 typewriter/printer to my CoCo, but can't seem to get it to work. I've connected the TD line of the CoCo to the RD line of the typewriter, and I've connected the CD line of the CoCo to the typewriter, etc., but I can't get it to operate properly. The typewriter takes a normal DB25 RS-232 connector. The pin locations are listed below.*

Pin	Signal name	Code
2	Send Data	SD
3	Receive Data	RD
4	Request to send	RS
5	Clear to send	CS
6	Data Set Ready	DR
7	Signal gnd	SG
8	Carrier Detect	CD
20	External Ready	ER

These are listed exactly as in the manual.

Mike Sileo, Jr.
Glendale, NY

The configuration you refer to is the most common I have seen for a printer.

The key to success lies in the fact that one of the pins on the printer must signal the CoCo that the buffer is full, or the printer is busy, and not to send any more characters until this condition is cleared.

Install two jumpers on the DB25 connector at the printer, one between pins 4 and 5, and one between pins 6 and 8. Then, make the following connections:

CoCo	Printer
Pin 4	to Pin 3
Pin 3	to Pin 7
Pin 2	to Pin 20

See if that doesn't work, Mike.

Power Strip Shortcut Damaging?

• *I have my CoCo, monitor, disk drives and printer all plugged into a power strip. I normally keep the printer turned off unless I am using it. The rest is all left on and turned on and off with the switch on the power strip. Some people have said that I could be causing damage to the equipment by doing this. On the other hand, other people say there is nothing wrong with this method. Now for the final word . . . what do you say?*

Tom Wadsworth
York, PA

Tom, the only reason you have heard some rumors to this effect is that computers are susceptible to power line spikes caused by motor starting, appliances, etc. For this reason, conservative practice calls for turning on the computer last after all other accessories, such as printers or disk drives. Using the same premise, the computer should be turned off first, before all of the accessories. I wouldn't worry too much about turning everything on and off with a power strip, since most of the modern strips have transient suppressors built in anyway.

The Slow Scrolling Poke Blues

• *Let me first start off by complimenting you on the fine job you are doing with "Downloads." Many of my questions about the CoCo 2 have been answered again and again by information contained in your column.*

My question is concerning the slow scrolling `POKE` *(*`POKE 359,60`*). This is one of the most useful* `POKE`*s I know of for this machine. However, when I was finally able to purchase my first disk drive and connected it to the machine (I own a 64K CoCo 2), everything seemed to work as advertised except for one small problem. When I try to list a program using the slow scrolling* `POKE`*, the machine locks up and nothing can be done, save that of turning off the machine and powering back up after a few seconds. I also have a few programs that utilize this fine little* `POKE`.

Do you know of an alternate `POKE` *to be used while the disk system is hooked up? Or is this, in fact, a problem with the machine that should not exist? When the disk controller is removed, the system works as it should and this* `POKE` *works just fine. So far, this is the only problem I have encountered in the transistion to the real world of the fantastic disk drive.*

William P. Flinn
Spring Valley, CA

Bill, I think one of the most useful short utilities ever published in the RAINBOW was *Joylist* by K. Deahl. By using this utility you can `LIST` programs at any speed you wish. Here it is for you new subscribers.

```
300 '******JOYLIST*******
301 '****K. DEAHL-9/06/82*
302 '********************
303 FOR X=1000 TO 1015
304 READ A:POKE X,A:NEXT X
305 POKE360,3:POKE361,232
306 DATA52,86,189,169,222
307 DATA190,1,91,48,1,189
308 DATA167,211,53,86,57
309 END:'orNEWif you like
```

It works with disk systems, too. Don't try to `SAVE` anything, though, after you run this utility. You'll get strange results.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Your technical questions may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick DELPHI MAIL, then type `SEND` **and address TO: DANDOWNARD.**

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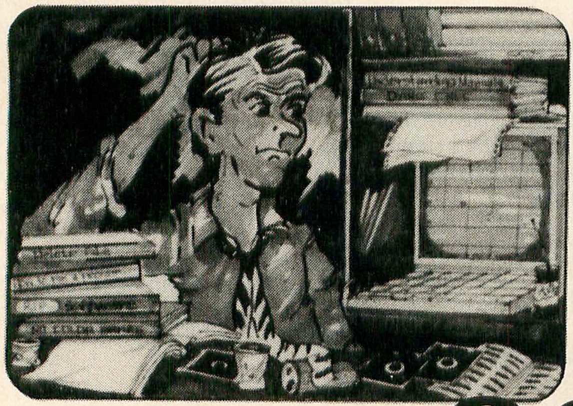

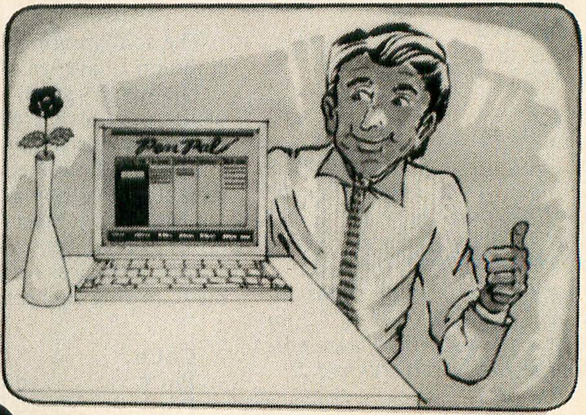

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ACCESSIBLE APPLICATIONS

DeskMate's Attributes Define Good Integrated Software

By Richard A. White
Rainbow Contributing Editor

We interrupt our discussion of BASIC09 to consider *DeskMate* for the CoCo, which has recently been released by Radio Shack. In keeping with the "Accessible Applications" theme, this applications package is truly accessible and meets a real need for simple, user-friendly software for personal use.

My brother-in-law, Art, bought a CoCo a number of years ago along with a disk drive and DMP-200, but had done very little with it. Neither had his two girls and wife, or so we thought. So Art asked what he might be able to sell the system for. I asked why it was not used. Seems his wife and older daughter felt an electric typewriter would be more useful since they had not been able to make the *VIP Writer* work. I understood. *VIP* might qualify as user hostile compared to other offerings.

We then had a little demonstration. I showed them *DynaStar* and how easy it was to get up and running. But, that wasn't for them either. Turning the computer into a typewriter was easier to handle. I wrote a short BASIC program that did just that. Julie, the 16-year-old, watched closely, following what I was doing with obvious understanding of the process. She mentioned that she had worked through the Color BASIC book last summer. Mom hadn't realized what she was doing nor what she had learned till now and was impressed. They took the program home on disk and quickly had it up and running. It worked well enough to show that something a bit more powerful was needed.

I had recommended they purchase *DeskMate*, particularly with the half price sale of CoCo software then going on. I decided to buy a copy myself to see what it would do; I am impressed. *DeskMate* comes on a nearly full 35-track disk. It is an OS-9-based package, but you don't need to buy OS-9 since a minimum version of OS-9, Version 2, is on the disk. Obviously, a 64K CoCo is required. If you want to use the telecommunications program, *Telcom*, you also need a multipack interface and the RS-232 Pak. However, all other parts of the package can be used without these pieces. And, I am assuming you have a printer — a computer without a printer is like a three-legged horse.

Type `DOS` and the system boots directly into a `PMODE3`, multicolor graphics menu asking you to enter the date and time. Then comes the main menu with the six applications available in Folder 3, shown as icons with names beneath.

The folders refer to directories the user can select by using the '@' and right-arrow keys to move to the folder area. Type `@-*` and a new set of icons appear at the top of the screen after some disk action. Upon selecting the folder icon, I came to discover that folders 1 and 2 pointed to directory /D0, while 3 and 4 pointed to /D0/CMDS. These assignments are changeable.

Choose the printer and you get a spiffy diagram with a dimensioned page showing current margins, line length and lines per page. Pressing the ENTER key moves the cursor to each setting in turn, inviting the user to make any changes one at a time. Similarly, you can change the time and date, and change the screen display colors (dark on light or light on dark). Choose the mouse and choose if you want to use a joystick or mouse along with the keyboard. All choices are recorded in a "config" file and are active each time you run the program. These choices can also be checked and changed from any *DeskMate* application.

Next to the printer icon is a calculator. Choose it and a calculator appears

---

Richard White lives in Fairfield, Ohio, and has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the co-author of the TIMS *database management program.*

on the screen. Type in numbers and operators as you would in any calculator to make it work. It even has a memory you can add to, subtract from, recall or clear. Leave calculator and it returns to the application from which you came.

There are six applications in Folder 3: *Calendar, Index Cards, Ledger, Paint, Telcom* and *Text Editor*. All except *Paint* are similar to the Tandy 1000 counterparts. *Telcom* requires use of the RS-232 ROM pak. *Paint* is a four-color picture editor. Each application has a menu bar at the top with a limited choice of pull-down menus. "Files" is always a choice with submenu choices, which always include CLOSE. CLOSE is used to close all active files and leave the application.

Sensitive as I am to spreadsheets, I gave *Ledger* a first look. I expected no more than a minimum spreadsheet and that is what it is but with a few nice touches. One can set column widths individually. Less exciting is the column width automatically expanding to accommodate wider labels. I don't think I want my carefully designed columns changing automatically. Still, someone is trying for a new idea for a change. In the speed department, *Ledger* is no *DynaCalc*, but it seems to be faster than the Tandy 1000 *DeskMate* spreadsheet on recalculation.

Ledger is limited to 100 columns and 100 rows. There is only enough memory to use part of this grid. But, this is typical of all spreadsheets in memory-limited machines. If you need to do big spreadsheets, buy *DynaCalc*. If this won't do it, you will have to spend big bucks for an MS-DOS machine and *Lotus 1-2-3* or another spreadsheet.

I was very glad to find that one can save all or part of the spreadsheet as a document file. This means a spreadsheet can be worked up and its display transferred to the *Text Editor* to include in a report or letter. A document file cannot be read into *Ledger*, so be sure to make a normal save of your spreadsheet as well.

Portions of the spreadsheet can be selected for printing. This allows you to print sheets that have more columns than the printer can print onto a page. More capable spreadsheets can do this automatically, while it must be done manually with *Ledger*. The important thing is that it can be done. I don't want to lose sight of the fact that *DeskMate* applications are intended to perform basic functions and not have all the bells and whistles in the world. In fact, if they had put much more into *DeskMate*, it would not have fit onto one disk.

Ledger uses commands that are common to most of the other applications in the package. This common command structure is one of the advantages one should get in an integrated applications package. It makes it much easier to learn the applications if one needs to learn how to Select and Copy only once. We will come back to *Ledger* later and give some applications.

The most-used computer application is the text editor or word processor. A word processor is a more powerful text editor. (Don't ask me to draw the line between the two.) *DeskMate*'s *Text Editor* is aptly named since there is a lot it does not do. However, it does get words into a file, edits them fairly easily and lets you print them with specified margins, line lengths, lines per page, etc. I did my monthly column for our user group newsletter with the *Text Editor*, then sent it by modem to the editor using *Telcom*. This was as easy as using my normal *DynaStar* and sending the file with a different telecommunications package.

> "Choose the printer and you get a spiffy diagram with a dimensioned page showing current margins, line length and lines per page."

A word about the display. It is 32 characters by 22 lines, which is all that can be reasonably expected for `PMODE3` graphics. It is always in graphics, so it does display true lowercase. It should work even on a crummy color TV, which has to be the design objective, and its reasonably fast.

The *Calendar* program is fun, but has a future problem. You can use "find date," type in the target date as, say, 4/15/86, and it displays the April calendar and any notes for that date. Type in 1/1/00 and you get January 1, 1900, rather than January 1, 2000. If you are a worry wart, you can get a fabulous 15-year worry from this. Even worse, zeros sort before any other numeral. There are vast quantities of computer files that carry their date stamp in the form of MM/DD/YY, or some similar way with a two-digit year code. Starting on January 1, 2000, most current date sorting routines quit working properly. Whole countries could grind to a halt!

But, I digress. I did do some closer term checks, like proper handling of February in leap years and checked a couple of 1987 months against my pocket calendar. It will work for the next 14 years, which is eons in the computer world.

Notes and appointments for various days are entered in the future as far out as you have information. You have available all the editing tools that are in the *Text Editor* and they work exactly the same way. The file can be searched using the "7 find" command for any or all occurrences of specific text, such as "computer group meeting." Note that I wrote "7 find." This is the way the command appears in the pull-down menu. The '7' means you could have called "find" by typing `@-7` without going to the menu. As you use *DeskMate*, you will come to remember that @-7 means "find" in those applications that have the find command, and start using it to speed up your work.

Future CoCos will have an "alternate" key (ALT) according to the *DeskMate* manual. Therefore, reference is made to [ALT]-7 and similar keystrokes throughout the manual. Since no CoCos have an "alternate" key yet, the '@' key substitutes.

As co-author of the *TIMS* database programs, there are features in the *Index Cards* personal filing system that I appreciate. As in any database manager, you must predefine and name fields for each record. Field lengths must also be predefined. This also is typical of most database managers. There can be up to 22 fields, and there seems to be no limit on field length. Since the file is memory resident, there is a trade-off. If the records are short, you can get quite a few into the file. If they are long, only a few will fit.

You can designate which fields to sort on and define primary, secondary and tertiary sort fields. This means the program sorts based on the primary field until it finds identical entries. When this happens, it sorts these records according to the contents of the secondary or tertiary field, as necessary, to order the records. Since the complete file is in memory, sorts and searches are fast.

Individual records can be printed. Individual records can be marked and printed, or you can print all records in the file. You can also select which fields to print. I have found no way to suppress printing the field names, nor have I found a way to print to a disk file so the records can be transferred into the *Text Editor*. These are unfortunate omissions. Many times one does not want field names printed. If you could suppress printing field names, a mailing list could be set up and mailing labels printed.

Another possible use for a filing program is in researching a report or school assignment. Notes can be kept in the *Index Cards* program, sorted in various ways and certain ones selected for inclusion in your final document. Unfortunately, those notes cannot be sent to a document file. You have to print them and then retype them into the *Text Editor*.

When entering a record, you have all the editing tools that are also available under the *Text Editor*, so there is little new to learn when you use *Index Cards*.

Telcom is an adequate telecommunications package. I have used it on both bulletin boards and for direct file transmission. As it comes, it requires the RS-232 ROM pak in the Multi-Pak Interface. However, OS-9 owners who have experience in customizing system disks will be able to make it work through the CoCo serial port. This means using the old RS-232 driver with a device discriptor for the serial port. I have not tried this; if you do this successfully, please write and we will share your results.

Upon entering *Telcom*, a status display is presented that lets you configure a file for a particular communications service. Since a number of status files is allowed, you give each a name. Next, logon information can be defined, such as your name and password, which is sent when you press @-8 and @-9. Next, enter your serial port device name, which is /T2 as the program is supplied, but which may also be something else as noted above. You can then change the parameters' Baud rate, word length, parity, stop bits, line feeds and echo. The default settings are the most typical ones encountered. If you have a 1200 Baud modem, you need to change the 300 Baud default. If you are going to communicate with an IBM mainframe or type to a friend, you need echo on.

Once the file is saved, it can be selected and opened each time you enter *Telcom*, then go directly to the terminal or memory modes.

Terminal mode is what you need to communicate interactively with another computer. All information you and the other computer transmit is stored in a revolving, 13K-byte buffer. When the buffer gets full, *Telcom* goes to its beginning and writes over the contents at the beginning. The buffer contents can be viewed from the Memory mode.

There are a number of other things that can be done from Memory mode. The file menu gives options to open (load) a text file with a .DOC extension into the buffer. You can also save, erase or print the buffer. The .DOC extension is automatically added when the buffer contents are saved.

Files can also be received from another computer or sent. If an extension is supplied ("Send" requires an extension), any *DeskMate* or OS-9 file can be transferred. Transfer is made directly from or to the disk and the file is not written to the screen. An eight-bit word length needs to be used to transfer non-text files, so you might as well set up for eight bits in your status files. For the transfer to work, the other computer must recognize XON, [CTL]-Q and XOFF, [CTL]-S. Most computers recognize the control characters, which mean start sending and stop sending, respectively. *Telcom* does not recognize any error checking protocols such as XMODEM.

Paint is a four-color picture editor with a variety of tools, like pencil, box, circle, eraser, text and others. Shapes can be filled with various colors and patterns selected from a palette. You are also able to devise your own patterns for the palette.

Your pictures can be printed in black and white on any Radio Shack printer that works with your CoCo. Color pictures can be made using a Radio Shack Ink-Jet printer. Non-Radio Shack printers are not supported, which is no surprise. Of course, non-Radio Shack printers work with all the non-graphics applications.

Finally, the 186-page *DeskMate* book provides excellent tutorial and reference sections. This documentation is many times better than that provided with Tandy 1000 *DeskMate*.

For the bottom line, should you buy *DeskMate* or recommend it to a new, still-wet-behind-the-ears CoCo Owner? Should this be recommended to the longtime owner who has quit using the machine because of user-hostile software? Absolutely! If used at the point of sale, it could sell bunches of CoCos. And being OS-9 based, it will not become obsolete on future machines. On the other hand, experienced users may already have the application software they need.

Finally, don't think that just because you need only a text editor, you should not buy *DeskMate*. If you don't have the other applications that *DeskMate* includes, it will probably be worth your while to buy it and discover what spreadsheets, calendars and file programs can do for you.

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CHAPTERS: The Binary Number System - Memory and Data Representation - Introduction to MC6809E Microprocessor - Addressing Modes of the MC6809E - MC6809E Instruction Set - Assembly Language Programming with EDTASM+ - Assembly Language Programming - Assembly Language and Extended Color BASIC - Internal Control and Graphics - Technical Details.

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PRINTER UTILITY

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Changing Printer Parameters in Pascal

By Dennis H. Weide

If you're fortunate enough to have a printer for your CoCo, you know how fast a small box of paper disappears when writing and debugging programs. By changing printer parameters, it is possible to increase page capacity or use non-standard paper and index cards available for tractor feed printers. *Setprinter* is a machine language program that, when executed, allows you to send special control codes to the printer to change parameters.

What's a Control Code?

One advantage of dot-matrix printers over other types is that printer parameters can be changed via program control. Under normal conditions, most dot-matrix printers are set for 80 columns and 66 lines per page. This default font is called pica print. Changing to elite print increases the width of the page to 96 columns. Changing the line spacing to $^{1}/_{8}$th inch instead of the normal $^{1}/_{6}$th inch increases the page length to 88 lines. That's a 60 percent increase in page capacity. See Table 1 for the page capacities of other print fonts.

For the purpose of this article, we'll discuss the Epson MX and FX series printers since they are some of the more popular printers around. To change from pica print (10 characters per inch) to elite print (12 characters per inch), enter the line that follows. (ASCII code 27 (`CHR$(27)`) is the decimal value representing the ESCAPE key.)

```
PRINT#-2,CHR$(27);"M";
```

To change the line spacing from the normal $^{1}/_{6}$th inch to $^{1}/_{8}$th inch enter this line:

```
PRINT#-2,CHR$(27);"0";
```

To change the page length from 88 lines to 80 lines so shorter paper can be used, enter:

```
PRINT#-2,CHR$(27);
"C";CHR$(80);
```

This assures that all form feeds work properly when sent to the printer.

This becomes tedious if changing paper sizes or page layout very often. A BASIC program could do all this for you, but it would have to be loaded and run each time needed, wiping out any other BASIC program in memory.

That's where *Setprinter* comes in. It's an address-independent machine language program that can be loaded and executed while BASIC programs reside in memory.

Table 1
Page Capacity (Including All Margins)

Font	Columns	Lines	Characters	Capacity
pica	80	66	5280	100%
elite	96	66	6336	120%
condensed	136	66	8976	170%
pica	80	88	7040	130%
elite	96	88	8448	160%
condensed	136	88	11968	227%

Dennis Weide is a communications technician for AT&T in Albuquerque, New Mexico, where he programs AT&T and IBM PCs. He enjoys making toys and teaching computer programming.

To change printer parameters, execute the program and enter the letters corresponding to the functions to be installed. The program sends the proper control codes to the printer. You can exit the program and call it back later without having to reload it.

The program was written in PASCAL and compiled using *DEFT Workbench.* Listing 1 is the source code for *Setprinter.* For those who are new to computers, let me explain a little about PASCAL.

PASCAL versus BASIC

Like BASIC, PASCAL is a high-level programming language used to create computer programs. Unlike BASIC, which is usually interpreted, PASCAL is compiled. (Note: BASIC is usually interpreted in microcomputers but it can be compiled.)

In an interpreted language such as BASIC, the microprocessor in the computer reads each program line, converts it to the appropriate machine instruction, then executes it. Each time a program line is encountered, the microprocessor must repeat these steps. Therefore, BASIC instructions tend to execute more slowly than machine language instructions. An advantage of BASIC is that the program can be modified and immediately run to see the results. This makes debugging a BASIC program very simple.

In a compiled language such as PASCAL, you must first write the source code then compile it to form the machine language program. All this must be done before executing it the first time. If a bug occurs in the program, the source code must be modified and recompiled before it can be executed. Even so, PASCAL has many advantages over BASIC. Because the final program is machine language, it executes up to 20 times faster than BASIC and usually requires less source code than an equivalent BASIC program.

The Program

Now, let's look at the source code for *Setprinter* (Listing 1). After being compiled, the program occupies 5,610 bytes of RAM. It's relocatable so it can be moved anywhere in memory. Be sure to protect the program by loading it into graphics memory or using the `CLEAR` command (see *Getting Started with Color BASIC*).

As in standard PASCAL, the program name comes first (*Setprinter*) followed

Table 2
Addresses to Change for BASIC
Modification of Control Codes
(control codes shown are for the Star SG-10 series)

Decimal Address	Control Code	Code Function
4602	66	set pica print code 1
4609	1	set pica print code 2
4634	66	set elite print code 1
4641	2	set elite print code 2
4666	66	set condensed print code 1
4673	3	set condensed print code 2
4698	87	expanded on code 1
4705	49	expanded on code 2
4730	87	expanded off code 1
4737	48	expanded off code 2
4762	71	double strike code
4787	69	emphasized mode on
4812	52	italics mode
4837	83	superscript on code 1
4844	48	superscript on code 2
4869	83	subscript on code 1
4876	49	subscript on code 2
4901	56	disable paper out detector
4926	66	letter quality print code 1
4933	4	letter quality print code 2
5024	48	⅛th inch line spacing
5049	51	$^{10}/_{144}$th inch line spacing code 1
5056	10	$^{10}/_{144}$th inch line spacing code 2
5081	49	$^{7}/_{72}$nd inch line spacing
5106	77	set left margin
5194	81	set right margin
5283	67	set page length
5371	64	initialize printer

Listing 1: `SETPRT`

```
   (** SETPRINTER program by Dennis H. Weide **)
   (**                                       **)
   (**               (C) 1985                **)
   (**                                       **)
   (**  Written in Pascal using DEFT Pascal  **)


   program SETPRINTER(input,output);
   var PRTFILE : text;
       CODE1, CODE2 : integer;
       CHOICE : char;

   procedure PRINT1;
      begin
          write (PRTFILE,chr(27));
          write (PRTFILE,chr(CODE1));
          write (PRTFILE,chr(CODE2))
      end;

   begin
      rewrite (PRTFILE,':-2');
```

by the variable declarations. In my listing, commands are listed in lowercase characters and variables are listed in uppercase.

PRTFILE is a text file used as a printer buffer. CODE1 and CODE2 are integers (whole numbers) that are assigned the values of the control codes required.

Procedure PRINT1 is a subroutine to send the proper control codes to the printer. Subroutines in PASCAL must be declared in the beginning the same as variables. The three Write statements after the procedure declaration constitute the actual subroutine. They print ASCII 27, CODE1 and CODE2 to *PRTFILE*, the printer buffer declared earlier.

REWRITE instructs the processor to use the text file *PRTFILE* as a buffer for the printer. Every WRITE or WRITELN to *PRTFILE* after the REWRITE command is buffered for output to the printer.

CHOICE is a character variable used to determine the menu choice. Unlike BASIC, PASCAL variables are not initialized when the program is first executed, so CHOICE must be set to null. If it's

```
CHOICE:=' ';
while CHOICE < 'V' do begin
    CODE1:=0;
    CODE2:=0;
    page;
    writeln ('          program menu');
    writeln;
    writeln ('A. PICA         L. N.L.Q.');
    writeln ('B. ELITE        M. FORM FEED');
    writeln ('C. CONDENSED    N. LINE FEED');
    writeln ('D. EXPANDED ON  O. 1/8 IN.L.S.');
    writeln ('E. EXPANDED OFF P. 10/144 L.S.');
    writeln ('F. DBL STRIKE   Q. 7/72 IN.L.S.');
    writeln ('G. EMPHASIZED   R. LEFT MARGIN');
    writeln ('H. ITALICS      S. RIGHT MARGIN');
    writeln ('I. SUPERSCRIPT  T. PAGE LENGTH');
    writeln ('J. SUBSCRIPT    U. INIT PRINTER');
    writeln ('K. PAPER OUT    V. END PROGRAM');
    writeln;
    write ('   ENTER ONE OF THE ABOVE >');
    readln (CHOICE);

    case CHOICE of
        'A': begin
             CODE1:=66;
             CODE2:=1;
             print1
         end;

        'B': begin
             CODE1:=66;
```

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```
        CODE2:=2;
        printl
    end;

  'C': begin
        CODE1:=66;
        CODE2:=3;
        printl
    end;



  'D': begin
        CODE1:=87;
        CODE2:=49;
        printl
    end;

  'E': begin
        CODE1:=87;
        CODE2:=48;
        printl
    end;

   'F': begin
        CODE1:=71;
        printl
    end;

  'G': begin
        CODE1:=69;
        printl
    end;

  'H': begin
        CODE1:=52;
        printl
    end;

  'I': begin
        CODE1:=83;
        CODE2:=48;
        printl
    end;

  'J': begin
        CODE1:=83;
        CODE2:=49;
        printl
    end;

  'K': begin
        CODE1:=56;
        printl
    end;

  'L': begin
        CODE1:=66;
        CODE2:=4;
        printl
    end;

  'M': begin
        write (PRTFILE,chr(12))
    end;
  'N': begin
        write (PRTFILE,chr(10))
    end;
```

not set to null at the beginning of the program, it is set to the value currently residing in its memory location. Upon execution, everything may work fine. But if executed a second time, the value of CHOICE remains set to its former value and program execution stops.

WHILE sets up a loop that continues to execute as long as CHOICE is less than 'V' (End program).

Two variables, CODE1 and CODE2, are set to zero each time through the While loop. If a second control code is not required for a specified parameter, CODE2 equals zero when sent to the printer.

PAGE is the same as `CLS` in BASIC. It clears the screen and homes the cursor.

The WRITE and WRITELN statements correspond to BASIC's `PRINT` statements. If a file is not specified, the characters or variables following the statement are printed on the screen.

READLN waits for an input from the keyboard the same as the BASIC statement `INPUT`.

CASE CHOICE OF works like BASIC's `ON X GOTO`. After the value of CHOICE has been entered, the CASE statement determines which of the BEGIN statements following it should be executed. BEGIN statements must always conclude with an END statement.

One important asset of PASCAL is that variable names can be more than two characters long, making it easier to name them. In BASIC, A$ and A1$ are two separate variables. But A1$ and A1B$ are the same since the CoCo only recognizes the first two letters of a variable name. Thus, CODE1, CODE2 and CHOICE are easier to understand than C1, C2 and C3. Notice that strings in PASCAL don't use the dollar sign ($) as they do in BASIC.

Other Program Functions

For those who program in PASCAL or are more advanced in BASIC programming, here are some tips for modifying the program to suit your printer. *Setprinter* loads at address 3592. Listing 2 is a short BASIC program that creates an ML program to set the Baud rate. If you run the printer at a speed other than 600 Baud, `LOADM"SETPRT"`, key in Listing 2 and then run it. It appends the ML program to *Setprinter* and saves it to disk. Thereafter, every time you load and execute *Setprinter* it automatically

Table 3
Start Addresses for the Menu Option Listing
(each address indicates the start of the letter designating the menu choice)

Start Address	Menu Option
4004	A) pica
4020	L) N.L.Q.
4047	B) elite
4063	M) form feed
4093	C) condensed
4109	N) line feed
4139	D) expanded on
4155	O) ⅛ in. L.S.
4187	E) expanded off
4203	P) $^{10}/_{144}$ L.S.
4235	F) DBL strike
4251	Q) $^{7}/_{72}$ in.L.S.
4284	G) emphasized
4300	R) left margin
4332	H) italics
4348	S) right margin
4381	I) superscript
4397	T) page length
4429	J) subscript
4445	U) init printer
4478	K) paper out

sets the computer to the new Baud rate. The second data element (Hex 01) of Line 140 is the Baud rate. Change that value to the hexadecimal value for the speed you use. Currently, the program sets the Baud rate at 9600.

As written, this program works for the Star and Gemini brand printers. If you have an Epson or some other brand, refer to Table 2 for the addresses to change. If using a PASCAL compiler, change the values in the source code listing (Listing 1). If not, use the BASIC POKE command and the printer manual to load the proper values into the proper addresses.

Since not all brands of printers are created equal, you may want to change some of the program menu options. Again, if using a PASCAL compiler, change the source code listing. If not, refer to Table 3 for the start address of each menu option. This is the address of the letter corresponding to option title. For example, decimal address 4004 contains decimal 65, which represents the letter 'A' in the option title A. PICA. If you wish to change it to print A. STANDARD, POKE the appropriate addresses with the ASCII code for the letters to be printed on the screen. Be careful not to exceed the original word length or a portion of the program may be overwritten.

I wrote three different PASCAL versions of this program and found the one with the most source code generated the shortest machine language program. That's the version I've included here. I've also included an ML copy of the program for RAINBOW ON TAPE for those who want the program but don't have a PASCAL compiler. Follow the guidelines mentioned to modify the ML version using BASIC.

For information on how to obtain a machine language copy of the *Setprinter* program for your printer (for a small fee), write to me at 14201 Marquette N.E., Albuquerque, NM 87123. Please include a self-addressed, stamped envelope for your reply.

One last comment. I bought the *DEFT Workbench* in an effort to learn PASCAL programming. It's an outstanding package of programs from the novice's point of view. However, the software authors warn that this is designed primarily for those who know PASCAL already. Still, with a few PASCAL books from the local bookstore and *DEFT Workbench*, I've come a long way. My compliments to the people at DEFT. ☐

```
            'O': begin
                   CODE1:=48;
                   printl
                 end;

            'P': begin


                   CODE1:=51;
                   CODE2:=10;
                   printl
                 end;

            'Q': begin
                   CODE1:=49;
                   printl
                 end;

            'R': begin
                   CODE1:=77;
                   write ('    ENTER LEFT MARGIN > ');
                   readln (CODE2);
                   printl
                 end;

            'S': begin
                   CODE1:=81;
                   write ('    ENTER RIGHT MARGIN > ');
                   readln (CODE2);
                   printl
                 end;

            'T': begin
                   CODE1:=67;
                   write ('    ENTER PAGE LENGTH > ');
                   readln (CODE2);
                   printl
                 end;

            'U': begin
                   CODE1:=64;
                   printl
                 end
          end
      end;
      page
  end.
```

Listing 2: SETBAUD

```
10 '   BAUD RATE CHANGE PROGRAM
20 '   FOR USE WITH SETPRINTER
30 '   LOADM"SETPRT" THEN RUN
40 '   THIS PROGRAM. THE NEW
50 '   BAUD RATE WILL BE PATCHED
60 '   INTO SETPRT WHEN SAVED.
70 '   HEX ADR 0E02 = BAUD RATE
80 '
90 '
100 FOR X=&H0E01 TO &H0E07
110 READ A$:A$="&H"+A$
120 POKE X,VAL(A$)
130 NEXT X
140 DATA C6,01,8E,00,96,E7,80
150 SAVEM"SETPRT",&H0E01,&H23EA,
&H0E01
```

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BARDEN'S BUFFER

Disassembling the Secrets of ROM

By William Barden, Jr.
Rainbow Contributing Editor

One of the highlights of February '86, for me, was the RAINBOWfest/PCMfest in Palo Alto, California. Even torrential rains couldn't keep the CoCo nuts and Tandy MS-DOS devotees away. (It was rumored that Apple had commissioned a cloud seeding operation over the Silicon Valley, prompted in part by the 'fests, but this was never substantiated . . .) While touring the exhibits at the show and killing some time before my seminar on computer languages, I noticed a cryptic sign that simply stated, "Another Interesting Seminar This Way," with a *CoCo Max*-like arrow pointing down a somewhat dimly-lighted hallway. Always looking for the unusual, I walked down the corridor. Ahead I could hear a speaker. I arrived at a room packed with people.

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years experience in the industry covers a wide background: programming, systems analyzing and managing projects ranging from mainframes to microcomputers.

"What seminar is this?" I asked a fellow near the entrance.

"You're not from MicroSoft or Radio Shack, are you?" he queried, looking me up and down.

Apparently satisfied that I wasn't wearing the charcoal-gray attire of Radio Shack types or the sandals and jeans of MicroSoft programmers, he stated, "This is a seminar on the secrets of MicroSoft BASIC. It describes how to decode ROM and other types of programs. You're in luck — it just started."

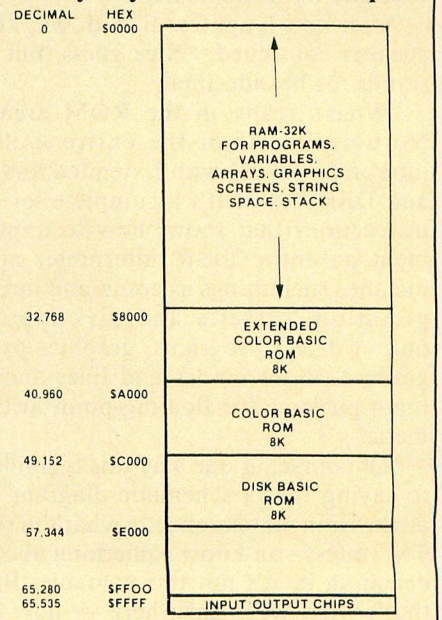
Sure enough, the speaker had mounted the podium and loosened his tie. It looked like a serious seminar.

What's in ROM?

"Maybe you didn't know that you can easily decode ROM in the Color Computer and get all kinds of information about ROM calls, programming techniques and system parameters," he began. "That's what this seminar is about — to reveal the mysteries of ROM by disassembly.

"First let's take a look at what's actually in the Color Computer. Take a look at this slide." The diagram shown in Figure 1 appeared.

Figure 1
Memory Layout in a Color Computer



"This is the memory layout of the CoCo. The 6809 microprocessor used in the CoCo addresses 64K of memory, or 65,536 bytes. One K equals 1,024 locations, of course. How that memory is divided up into RAM, ROM and input/output devices is pretty much up to the system designer who uses the 6809. Here's how Radio Shack did it though:

The first 32K (32,768 bytes) is RAM, or random-access memory. RAM is used to store system variables such as joystick values, addresses of commonly used software such as the command interpreter and pointers to variables and sections of memory. RAM also stores your actual BASIC or machine language program, BASIC variables and arrays, text and graphics screens, string space and BASIC stack.

"The upper 32K is generally used for ROM, or read-only memory. The CoCo contains a ROM that implements Color BASIC in locations 40960 through 49151 ($A000 through $BFFF). With Extended Color BASIC, there's another ROM in locations 32768 through 40959 ($8000 - $9FFF) that adds more programs for Extended Color BASIC functions. And in Disk BASIC, there's yet another ROM in the disk controller pack that adds more programs to handle Disk BASIC functions, this time in locations 49152 through 57343 ($C000 - $DFFF). The high portion of memory in the $FF00 area is used for dedicated input/output chips called PIAs. They control cassette, serial output, graphics modes and other operations."

"By the way, does anyone know what the dollar sign stands for?" asked the speaker.

"Big bucks in the CoCo!" shouted a wise guy in the audience.

After the laughter died down, the speaker continued, "Nice guess, but it stands for hexadecimal.

"What's really in the ROM areas? Nothing less than the entire BASIC interpreter, along with Extended BASIC and Disk BASIC! It's a complete set of instructions that shows how to implement an entire BASIC interpreter and includes such things as command interpretation, cassette and disk input/output driver programs, graphics programs to draw circles and lines and a math package for floating-point arithmetic!

"Of course, in one way this is similar to saying that a schematic diagram of a television set tells exactly what's in the TV. Unless you know something about decoding it, it's not too valuable. But that's what we'll learn here — how to decode it."

Machine Language versus Assembly Language

"When MicroSoft or Radio Shack writes programs, they start with assembly language code. Here's a sample . . ." Another slide flashed on the screen (Figure 2).

Figure 2
Scroll Screen Subroutine

```
A34E  EC  88 20    SCOLLS  LDD    32,X        load two bytes
A351  ED  81               STD    ,X++        store one row up
A353  8C  05ED             CMPX   #LINE15     last line?
A356  25  F6               BLO    SCROLLS     go if no
A358  C6  60               LDB    #$60        blank character
A35A  BD  A92D             JSR    BLANKL      fill last line with blanks
A35D  35  96               PULS   A,B,X,PC    restore regs and return
```

"This is the actual code in Color BASIC to scroll the screen. It moves two bytes up one row at a time for the last 15 lines of the screen and then blanks out the last line of the screen. The BASIC interpreter is made up of dozens of routines such as this, some about the same order of complexity, some more elaborate.

"After MicroSoft wrote the Color BASIC interpreter and checked it out, the machine language corresponding to this assembly language code was burned into ROM. The machine language consists of the actual ones and zeros that represent the assembly language instructions. In this case, for example, you'd see EC, 88, 20, ED, 81, 8C, 5, E0, 25, F6, C6, 60, BD, A9, 2D, 35 and 96 values in hexadecimal for the seven instructions of the screen scroll routine."

"What about the source code?" asked a CoCo user in the front row. "Can't we buy it from someone?"

"Not really," the speaker replied. "MicroSoft doesn't bandy it about. They'd like to prevent others from producing competitive BASIC interpreters. The source code isn't anywhere in the machine language either. The machine language just includes thousands

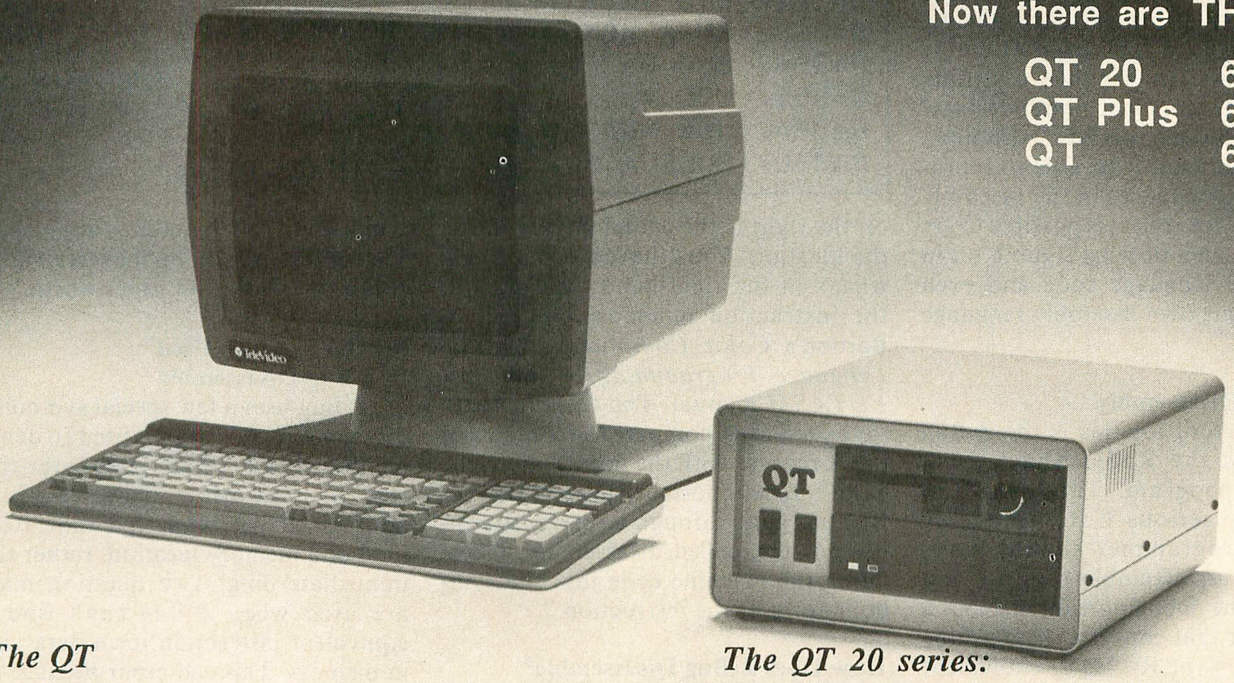
Figure 3
Entry to Z-Bug

```
DISK EXTENDED COLOR BASIC 1.0
COPYRIGHT (C) 1981 BY TANDY
UNDER LICENSE FROM MICROSOFT

OK
RUN "DOS"                                  (enter this)
  .
  .
COLOR TRSDOS 01.07.00  11/82
BY R.G. KILGUS
COPR. 1982 TANDY CORP.
ALL RIGHTS RESERVED

   1. EXIT TO BASIC
   2. EXEC A PROGRAM
   3. START CLOCK DISPLAY
   4. DISK ALLOCATION MAP
   5. COPY FILES
   6. DIRECTORY

                                           (Press 2)
     .
     .
EXECUTE A PROGRAM

PROGRAM NAME: (EDTASM -/BIN               (enter EDTASM)
     .
     .
DISK EDTASM+ 01.00.00
COPYRIGHT (C) 1983 BY MICROSOFT

*Z                                         (enter Z)

#                                          (now in Z-BUG)
```

More Incredible!

Now there are THREE!

QT 20	68020
QT Plus	68000
QT	68008



The QT

The *QT* family of multi-user, multi-tasking computers supports from 4 to 20 users. Currently 9 models are available, ranging in price from $ 1,595 to $ 8,795. Models are available with the Motorola 68008, 68000 or the new 32 bit 68020 CPU. CPU speeds range from 8 Mhz to 16.67 Mhz; RAM size from 128K to 2048K and ROM from 2K to 256K. All the *QT*'s have a built in SASI interface and will support any hard drive. All *QT*'s include OS9/68K, the multi-user operating system with Basic, utilities, word processing and spreadsheet programs. The *QT*'s take up less than one cubic foot of space.

The QT series:

The basic *QT* has 128K RAM, 68008 CPU, 8 Mhz and will support 4 users and 2 printer ports. The single floppy version is priced at $ **1,595** (List $ 2,095) and is field upgradeable to 512K RAM and 20 Meg hard drive. This system sells for $ **2,995** (List $ 3,595).

The QT Plus series:

This *QT* has 512K RAM, 68000 CPU, 10 Mhz and supports 4 users and 2 printer ports. The single floppy version is priced at $ **2,095** (List $ 2,695) and is field upgradeable to 1024K, 8 serial ports and hard disk. The ***QT Plus*** 4 user system with 512K RAM and 20 Meg hard drive is priced at $ **3,495** (List $ 3,995). The 512K upgrade costs $ **395** (List $ 495).

The QT 20 series:

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QT Price List 1986

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QT 1 Drive	**$1,595**	$2,095
QT 2 Drives	**$1,750**	$2,295
QT 20 Meg HD	**$2,995**	$3,395
QT+ 1 Drive	**$2,095**	$2,695
QT+ 2 Drives	**$2,250**	$2,895
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OS9 is a trademark of Microware

of thousands of machine language instructions, which the 6809 microprocessor executes to implement the BASIC interpreter functions.

“Now here's the big question: Is it possible to *reverse* the assembly language process — instead of producing machine language code from assembly language code, to produce assembly language code from machine code data? With a little bit of effort, yes. Although, you'll probably never be able to reproduce all of the nuances in the assembly language source code it is possible to get a very good idea of what's going on in the machine language code and even construct your own assembly language source code.”

Z-Bug and Disassembly

“The first tool for this is the Z-Bug debugger of the Radio Shack Disk *EDTASM* program. This program, which every serious CoCo assembly language programmer should have, consists of an assembler, editor and debugger. The debug portion includes a disassembler that converts the machine code in ROM (or RAM) to equivalent assembly language instructions. To get into Z-Bug, do this . . .” Another slide flashed on the screen (Figure 3).

“This is the Disk BASIC version of *EDTASM*, but the same general procedure is applicable for the cassette version. First, run *DOS* when the Disk Extended BASIC message is on the screen. That'll bring up a menu of items for COLOR TRSDOS from which you can EXEC A PROGRAM. The program to execute is *EDTASM/BIN* (32K and above) or *EDTASMOV/BIN* (16K).

“Once you're in *EDTASM*, the DISK EDTASM+ title is on the screen, together with an asterisk prompt. From there, enter `Z`, for Z-Bug, and a '#' sign is displayed, indicating that you're in Z-Bug.

“Now press the 'M' key, followed by ENTER. Entering an 'M' sets the Mnemonic mode, meaning that debug will display 6809 instruction mnemonics, rather than hexadecimal data. Now, just as an example, enter `T A34E A35E`, followed by the ENTER key. The display looks like this (Figure 4).

Figure 4
Typical Trace in Mnemonic Format

```
0A34E/ LDD <20,X
0A351/ STD ,X++
0A353/ CMPX #5E0
0A356/ BLO 0A34E
0A358/ LDB #60
0A35A/ JSR >0A92D
0A35D/ PULS A,B,X,PC
```

“The T command in Z-Bug displays a block of memory locations. In the Mnemonic mode, these memory locations are displayed in their symbolic instruction formats. The column on the left of the display is the starting locations for the instructions. The column on the right is the actual instruction in the location. You'll have to coordinate what's in the right-hand column with the instruction mnemonics found in Barden's *Color Computer Assembly Language Programming* or the Disk *EDTASM* manual. The CMPX #5E0, for example, is 'compare the contents of the X register with the immediate value $5E0'. The important thing is that Z-Bug has gone through a reverse assembly process, called disassembly, translating the machine code into the symbolic form of the instruction.”

How Does Z-Bug Disassemble?

“But how does Z-Bug know enough to disassemble the machine language?” asked a young hacker with an “I Love my CoCo” button fastened to his “Twisted Sister” tee-shirt.

“Well, the machine language code always starts with an operation code byte,” replied the lecturer. “Each type of instruction has a unique op code. Z-Bug uses this to find an equivalent mnemonic in an internal table. It also knows the format of each instruction and can determine whether data in the instruction is an address, as for a BR(anch) instruction, an immediate operand, as in this example, or some other operand form. The operand or operands are printed after the instruction mnemonic.”

“Yeah, but if Z-Bug starts in the middle of an instruction . . .,” persisted the hacker.

“Good point,” the lecturer went on. “If the middle of an instruction is specified for the start, you'll get garbage instructions for a time, before Z-Bug straightens itself out. Suppose you started from A34F instead of A34E. You'd get

```
#A34F/ EORA #20
```

in place of the correct

```
#A34E/ LDD <20,X.
```

You can use either the T command to display the contents of a block of memory on the CoCo screen, or the TH form of the command to dump the contents on the printer. The TH ('H' stands for Hard copy) displays the same information as the T command. If you want a complete listing of all the instructions in both Color BASIC and Extended Color BASIC, simply do a

```
#TH 8000 BFFF
```

command, and it returns about 8,000 lines of instructions on the screen or line printer — about 145 pages worth.”

Special Symbols Used in Z-Bug Disassembly

“Z-Bug uses a few special symbols in disassembly. A '#' sign is used to denote an immediate value. A greater-than sign, or right arrow, indicates a jump address. A less-than sign indicates a load of a memory location, rather than immediate data. Two question marks are used when Z-Bug can't find an equivalent instruction for a data value in memory. This can occur because not all permutations of codes are legitimate instructions.

“Here's an important point — all numeric data is in hexadecimal, rather than decimal. The display of data can be changed to decimal by entering an `O10` into Z-Bug, specifying an output base of decimal instead of hexadecimal, but you'll probably want to work in hexadecimal anyway — it's actually more convenient, once used to it.”

Instructions versus Data

“ROM contents consist of more than just instructions, however. Along with the instructions there is data. Data in Color BASIC, Extended Color BASIC and Disk BASIC generally consists of these types of things:

“Indirect Jump Tables — This table is found at the beginning of Color ROM at $A000. It consists of seven addresses for reading a key, generating a character, cassette on, read a cassette block, write a cassette block, reading the joysticks and writing a cassette leader.

“Tables of Data — These include such things as 'token' tables, tables of constants to be moved to low address RAM, other jump tables, and the like — anything that can be conveniently tabulated. The sine wave used for a cassette tone, for example, is produced from a table of sine wave values.

“Text Messages — These include

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DynaStar is our most popular word processor for OS9. *DynaStar* works with O-Pak and WordPak I and II. *DynaStar* will also work with Level II OS9, which means that an upgrade will be available for the new CoCo that runs Level II OS9. ***DynaForm***, the text formatting part of *DynaStar* has *Mail-Merge*, an extra cost option on other word processors.
A terrific buy at only **$49.95** each.

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To use the full potential of the *Display 80* you will need a video driver. ***UVD*** is the best we have seen because it works with all versions of the CoCo and requires NO soldering! Only **$29.95**

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You can buy cheaper drives for your CoCo but you can't buy better! Even Tandy sells cheaper drives than we do. We don't want to lower our standards so we still sell the best drive for your money. We only sell double sided drives in the best case we could find with a power supply that won't quit. We use the best controller on the market (The new **Disto Super Controller**) the best drives (Teac) and our case.

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titles, error messages and prompt messages.

"So you can see that you won't find instructions in all locations of ROM — perhaps 95 percent of ROM actually consists of 6809 machine language code — the rest is data. The data, by the way, disassembles as garbage instructions."

"So how do you display data?" questioned a female CoCo freak, while cuffing her 10-year-old as he tried to disassemble a Tandy 3000.

Displaying Character Data

"Well, a lot of data consists of ASCII characters. One of the best places to start for a disassembly of any program is with character data such as messages or tables of commands. Z-Bug allows the display of the equivalent ASCII data if an 'A' for ASCII is specified after the Z-Bug prompt. Any output is displayed as either a text character, if the character is printable, or as a blank, as shown in the next slide (Figure 5).

Figure 5
Display of ASCII Data by Z-Bug

```
0A147/ C
0A148/ O
0A149/ L
0A14A/ O
0A14B/ R
0A14C/
0A14D/ B
0A14E/ A
0A14F/ S
0A150/ I
0A151/ C
0A152/
0A153/ 1
```

"However, this display is not very condensed — it doesn't show long strings of text as found in messages. The short BASIC program *SCANTXT*, in the next slide, packs ASCII data together so you can easily scan through memory (Figure 6).

Figure 6
***SCANTXT* Program**

```
100 'SCAN FOR TEXT
110 CLS
120 INPUT "START"; ST
130 INPUT "END"; LS
140 FOR I=ST TO LS
150 IF I/32 = INT(I/32) THEN
    PRINT I;"/ $";HEX$(I)
160 IF PEEK(I)>=32 THEN PRINT
    CHR$(PEEK(I)); ELSE PRINT
    ".";
170 NEXT I
```

"*SCANTXT* asks for a start address and an end address. These addresses can be entered with a hexadecimal prefix — '&H' in BASIC. *SCANTXT* then scans through the block, displaying the current address and any text data. Data that is not text data is represented by a period. A typical display from the program is shown in the next figure (Figure 7).

Figure 7
***SCANTXT* Display**

```
START? &HA13E
END? &HA175
■
 41280 / $A140
■.■.■)COLOR BASIC 1.2.(C) 1982
 41312 / $A160
TANDY,MICROSOFT..■.■9
OK
```

■ = GRAPHIC CHARACTERS

"A recommended way to scan through a program is to use a program such as *SCANTXT* to find the messages first. This provides valuable clues to the structure of the program, as the area associated with each message can be found by scanning memory for addresses representing the start of known messages. Here's an example: Scanning through Extended BASIC yields a table of error messages at $ABAF. The table starts with 'NF.' It would be advantageous to find out where in memory a Next Without For error message is generated. Unfortunately, Z-Bug does not have a Find function. However, BASIC comes to the rescue again with the program in the next slide (Figure 8)."

Figure 8
***FINDSTR* Program**

```
100 'SCAN FOR CHARACTER STRING
110 CLS
120 INPUT "START"; ST
130 INPUT "END"; LS
140 INPUT "SEARCH STRING"; S1$
150 INPUT "16-BIT VALUE"; V
160 FOR I=ST TO LS
170 IF V<>0 THEN IF V=PEEK(I)*
    256+PEEK(I+1) THEN PRINT
    V;"FOUND AT ";I;"/ $";
    HEX$(I): GOTO 240
180 IF V<>0 THEN 240
190 S2$=""
200 FOR J=1 TO LEN(S1$)
210 S2$=S2$+CHR$(PEEK(I+J-1))
220 NEXT J
230 IF S2$=S1$ THEN PRINT
    S1$;" FOUND AT ";I;"/ $";
    HEX$(I)
240 NEXT I
```

"This program scans memory between any start and end addresses, looking for any specified character string or any 16-bit address value. The 16-bit address value takes precedence over the string; don't enter anything for either one or the other. Finding address values helps correlate which parts of the program call subroutines at specific addresses."

Finding the Gold in Them Thar Codes

"Now that we know an approach to finding things in ROM, let's mine for gold and find some of those hidden subroutines. One thing I should mention, however, is that there are books that list source code for BASIC and Extended BASIC. *Color BASIC Unravelled, Extended BASIC Unravelled* and *Disk BASIC Unravelled* are excellent reconstructions of the source code in ROM and a bargain at $19.95 each ($49.95 for a three book set plus $3 shipping and handling). Contact Spectrum Projects, Inc., P.O. Box 21272, 93-15 86th Drive, Woodhaven, NY 11421. The technique used in these books is to publish code that looks exactly like an assembly listing, but with the opcode byte deleted. I suspect that the comments on this code are actually better than MicroSoft's documentation! It was obviously a labor of love by a dedicated programmer. Even though publishing code in this fashion might be analogous to waving red listings in front of a MicroSoft bull, what we're doing here poses no problems as Z-Bug itself provides the tools for examining memory."

At this point, the speaker cast an anxious glance at the door to see if he could detect any gray suits or sandal-clad hackers. He continued.

"Another useful book is called *500 Pokes, Peeks 'n Execs for the TRS-80 Color Computer* (Spectrum Projects, Inc., $16.95). It provides entry points for subroutine in ROM, along with locations of system variables.

"Anyway, let's see if I can describe the highlights of what can be found in ROM by using Z-Bug."

Input/Output Drivers

"I mentioned the indirect jump table at the start of Color BASIC ROM at $A000. Use the seven addresses here to find the subroutines for getting a key press, generating a character, turning on the cassette motor and so forth. Let's try the first address, the famous POLCAT subroutine described even in Radio Shack documentation.

"The address in the jump table is A1CB. Disassembling ROM starting from this area results in the code shown in the next slide (Figure 9).

Figure 9
POLCAT Disassembly

```
0A1CB/ PSHS U,X,B
0A1CD/ LDU #0FF00
0A1D0/ LDX #152
0A1D3/ CLRA
0A1D4/ DECA
0A1D5/ PSHS X,A
0A1D7/ STA 2,U
0A1D9/ ROL 2,U
0A1DB/ BHS 0A220
0A1DD/ INC 0,S
0A1DF/ BSR 0A23A
0A1E1/ STA 1,S
0A1E3/ EORA ,X
0A1E5/ ANDA ,X
0A1E7/ LDB 1,S
0A1E9/ STB ,X+
0A1EB/ TSTA
0A1EC/ BEQ 0A1D9
0A1EE/ LDB 2,U
0A1F0/ STB 2,S
0A1F2/ LDB #0F8
0A1F4/ ADDB #8
0A1F6/ LSRA
0A1F7/ BHS 0A1F4
0A1F9/ ADDB 0,S
0A1FB/ BEQ 0A245
0A1FD/ CMPB #1A
0A1FF/ BHI 0A247
0A201/ ORB #40
0A203/ BSR 0A22E
0A205/ ORA >11A
0A208/ BNE 0A20C
0A20A/ ORB #20
0A20C/ STB 0,S
0A20E/ LDX >11B
0A211/ BSR 0A1AE
0A213/ LDB #0FF
0A215/ BSR 0A238
0A217/ INCA
0A218/ BNE 0A220
0A21A/ LDB 2,S
0A21C/ BSR 0A238
0A21E/ CMPA 1,S
0A220/ PULS A,X
0A222/ BNE 0A22B
0A224/ CMPA #12
0A226/ BNE 0A22C
0A228/ COM >11A
0A22B/ CLRA
0A22C/ PULS B,X,U,PC
```

"I won't go through the entire subroutine because it's quite long — about 74 instructions. However, there are a couple of points to mention about decoding subroutines like this.

"The first thing to look for is the end of the subroutine. This is often an RTS instruction, but may also be a PULS instruction, as in this case. The PULS instruction pulls data from the stack and in some cases also pulls a return address and puts it into the PC register. This action is the same as an RTS. Between the start of the subroutine and the RTS or PULS, make certain that all branches (BRx instructions) are within the limits of the start and end points. Make certain that no jump is made out of the subroutine into another routine.

"Knowing the start and end points, look for the BSR, LBSR and JSR instructions. These instructions jump to lower-level subroutines. In the case of POLCAT, there are five BSR instructions, at A1DF, A203, A211, A215 and A21C. Z-Bug gives the absolute address of the branch instead of the relative displacement from the current instruction. This is nice, because it enables you to see immediately which branches are to the same subroutines. In this case, the BSRs at A1DF, A215 and A21C are to the same subroutine (A1DF is a second entry point) — a subroutine to actually scan the keyboard. The BSR at A203 is to another subroutine at A22E, which tests for the SHIFT key. The BSR at A211 is to yet another subroutine that delays for a keyboard debounce (if the keys were read at assembly language speed, it would read the key many times before it was released).

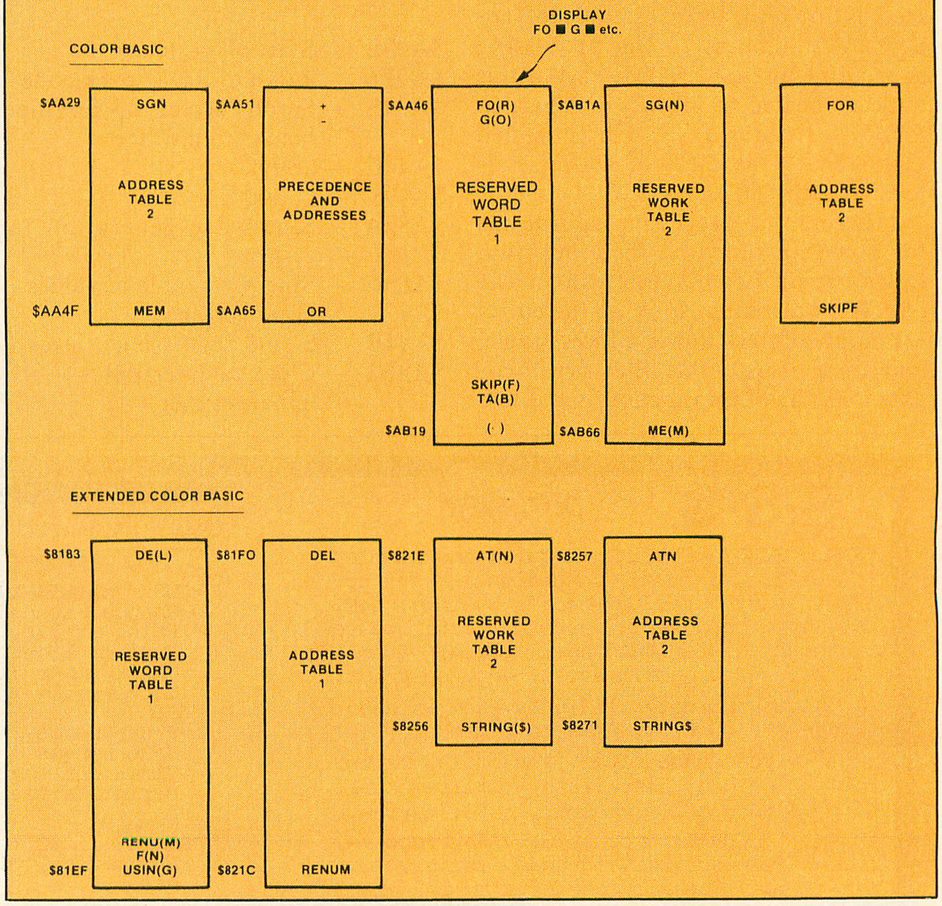
"A lot of code in BASIC calls a lower-level subroutine, which calls a still lower-level subroutine, and so on. There's no question that it's a chore to untangle the nested subroutines in many cases."

"What's that strange address in the second instruction — the FF00?" asked someone in the back of the room.

"Remember that I said the $FFXX area was devoted to input/output addresses? The very first instruction in POLCAT after the PSHS (which saves the registers) loads Register U with $FF00. This is a PIA address, an input/output chip used for much of the I/O in the CoCo. Unfortunately, to decode BASIC and other programs requires that you have some knowledge of the structure of the Color Computer's hardware."

There were audible groans from the audience.

Figure 10
Reserved Word and Address Tables


DISPLAY
FO ■ G ■ etc.
COLOR BASIC
$AA29
SGN
ADDRESS TABLE 2
$AA4F
MEM
$AA51
+
-
PRECEDENCE AND ADDRESSES
$AA65
OR
$AA46
FO(R)
G(O)
RESERVED WORD TABLE 1
SKIP(F)
TA(B)
( )
$AB19
$AB1A
SG(N)
RESERVED WORK TABLE 2
$AB66
ME(M)
FOR
ADDRESS TABLE 2
SKIPF
EXTENDED COLOR BASIC
$8183
DE(L)
RESERVED WORD TABLE 1
RENU(M)
F(N)
USIN(G)
$81EF
$81F0
DEL
ADDRESS TABLE 1
$821C
RENUM
$821E
AT(N)
RESERVED WORK TABLE 2
$8256
STRING($)
$8257
ATN
ADDRESS TABLE 2
$8271
STRINGS

"So much of the input/output is done by setting or reading PIA bits — things like cassette or sound-wave shapes, serial input or output, or in this case, reading the keyboard by looking at which row and column bits are set.

"The other input/output drivers are similar in concept to POLCAT. They do a lot of bit manipulation with the hardware."

General Locations of Other Functions

"One of the chief areas to disassemble in ROM is the reserved word table. Reserved words in BASIC are those reserved to define BASIC keywords or functions like INPUT, OPEN, RIGHT$ and so forth. If you use the *SCANTXT* program, which I showed before, to scan memory for text data, you'll see several of these tables, one located at $AA66, and one located at $8183 (Extended BASIC). See Figure 10."

"Notice that the last letter of each word shows up as a graphics character in the display. This is because the most significant bit is set to mark the end of the word, as each word is a variable length. This is the same as adding 128 to the value of the ASCII character.

"The position of the word in the reserved word table (first, second, 14th, etc.) is used to access a table of addresses that point to the processing subroutine in BASIC ROM. Part of this table is located at $AA29 and part at $AB67 for Color BASIC. For Extended Color BASIC the table of addresses is located at $81F0 and $8257.

"To find the processing subroutine for a certain function, therefore, find the position of the function in the reserved word table, look up the corresponding address in the address table, and then disassemble that area. For example, the PEEK function is the seventh entry in the second part of the reserved word table in Color BASIC — it's at location $AB2C. The seventh address in the address table at $AA29 is address $B750 at address AA35. Disassembling the $B750 area gives you the processing code for PEEK."

Can You Learn Assembly Language Techniques from ROM Code?

"Disassembling the ROM is a challenging task, but it provides lots of little useful subroutines that can be used for a variety of things. We'll give a thumbnail list in a moment. One other benefit of disassembly, though, is being able to look at 6809 code produced by a professional software company, MicroSoft. In digging through the disassembled instructions you'll be exposed to a variety of tricks and techniques in assembly language coding. With the disassembled code and a reference manual you'll quickly learn how to put things together in assembly language."

Interesting Areas to Look at in ROM

"Here are some interesting areas you might want to investigate. Next slide, please . . ."

Color BASIC ROM:

$A00E — Start of BASIC
$A0F6 — Jump to ROM pack code
$A34E — Scrolls screen up one line, blanks to last line
$A44C — CSAVE
$A498 — CLOAD
$A82A — Sine wave generation for cassette
$A85C — Sine wave table of values
$A928 — Clear screen
$A94B — SOUND processing
$A9B3 — Clock tic interrupt — updates timer
$A9DE — Joystick processing
$B9B4 — A large section of code devoted to floating-point number processing starts here and continues almost to the end of this part of ROM ($BFFF)

Extended Color BASIC ROM:

$8A09 — Renumber routine
$A429 — DLOAD or download subroutine — bugs in some versions
$928F — Start of graphics subroutines — another large section of code
$93BB — LINE processing
$9755 — GET processing
$98EC — PAINT processing
$9A22 — PLAY musical note processing — another large section
$9CB6 — DRAW processing — another large section
$9E9D — CIRCLE — drawn as a 64-sided polygon!

At this point in the seminar there was a bustle in the corridor outside of the room. Two beefy men burst in, one wearing a three-piece gray flannel suit and cowboy boots, the second in jeans and sandals. They went up to the podium and literally lifted the speaker several inches off the floor.

"And that's about all the time we have for this seminar," the speaker shouted over his shoulder as he was carried off. His voice faded as he disappeared down the corridor and we could only hear snatches — "secrets of ROM . . . other mysterious things we haven't gotten into . . . bugs . . ."

The audience groaned in despair and I shuffled off to the RAINBOWfest seminar on OS-9 . . .

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KISSable OS-9

Featuring a New Text Formatter

By Dale L. Puckett
Rainbow Contributing Editor

OS-9 Users Group member Frank Malaney of Pataskala, Ohio, takes the spotlight this month. Malaney contributed the source code for *PrintForm*, a public domain program he has been distributing as "shareware" for several months. He also passed along some useful C programming tips. Rounding out our May offering is an alternative, *SysGo*, from Robert A. Larson at USC; another tip from Steve Goldberg in Bethpage, New York; some short C programs for beginners from Dennis J. Duke in Bessemer, Alabama, and Eric Richards in Auburn, Alabama, plus a look at a few new OS-9 products. Remember, if you have a question, a short to medium-sized program or an operating tip, we would love to share it with our readers. Send your thoughts to us at THE RAINBOW or EMAIL them to DALEP on RAINBOW's Delphi CoCo SIG or to my PPN, 70010,542 on CompuServe.

PrintForm is Modular

PrintForm, our feature offering from Frank Malaney, performs most of the functions of *DynaForm* and corrects many of the printer problems that were present in early versions of this word processing software. The problems revolved around the printer setup standard used by Tandy. Most manufacturers set up their printers to only return the printhead to the left-hand margin after they receive a carriage return character, 0D Hex. Radio Shack printers, however, automatically add a line feed following every carriage return. This drives some software and most programmers crazy.

Ever since the first column, we have been preaching the virtues of OS-9's modularity, and Frank Malaney is a believer who broke the program into 18 different modules, small pieces ". . . to protect the sanity of the programmer," Malaney said. Breaking long programs into short segments also helps the computer, particularly a Color Computer with only 64K of memory. As you know, if you have ever tried to compile a long C or PASCAL program, most compilers generate a large number of error statements for each actual error in the source code.

"The best way to handle this situation is to correct the first error, recompile the program and then fix the next error that shows up, etc.," Malaney said. He also noted that small modules that perform a single function are much easier to debug after you get the program compiled but it still does not work properly. "It is much easier to determine which code is not working correctly and to rethink the logic when that module only performs a single task," he said.

The two-line C program, *test.c*, can also make your initial compiles go faster.

```
#include "header.c"
#include "useage.c"
```

Use this OS-9 command line:

```
OS9: ccl test.c -oa >>/p
```

Header.c is the name of a file that defines all of the global variables in *PrintForm*. *Useage.c* is the name of the file Malaney is checking for syntax errors. When you compile *test.c* with the previous command line, you are greeted with a very fast pass through the compiler and a list of all the errors on your printer.

When compiling *PrintForm* use the following OS-9 command line:

```
OS9: ccl pf.c -m=4k
```

This line increases the data space allotted to the program by 4K during the compile. This prevents running out of memory while printing nested files.

If you do not want to type in the *PrintForm* source code listed here, Malaney will send it on a disk for $15. He includes a copy of the manual on the disk, which can be printed out. Send check or money order to Frank Malaney, 8708 Mink Street SW, Pataskala, OH 43062. Enjoy!

Dale L. Puckett, who is author of The Official BASIC09 Tour Guide *and co-author, with Peter Dibble, of* The Official Rainbow Guide to OS-9, *is a free-lance writer and programmer. He serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. Dale works as a U.S. Coast Guard chief warrant officer and lives in Alexandria, Virginia.*

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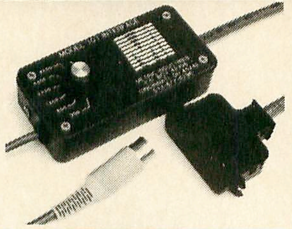
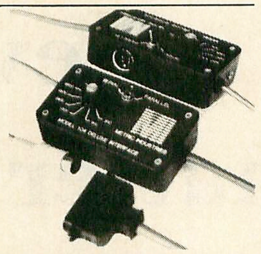
Model 101 Interface $39.95



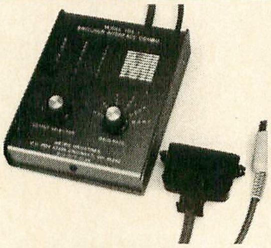
The Model 101 is a serial to parallel interface intended for use with a COCO and any Centronics compatible parallel input printer. The 101 has 6 switch selectable baud rates (300-9600). The 101 is only 4" × 2" × 1" and comes with all cables and connectors for your computer and printer.

The Model 104 Deluxe Interface $51.95



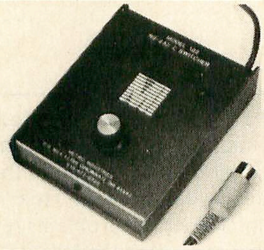
The Model 104 is a serial to parallel interface like the Model 101 but it has the added feature of a serial port (sometimes referred to as a modem switch). This feature allows the connection of a parallel printer and any serial device (modem, serial printer etc.) to your computer. You may then select either output, serial or parallel, with the flip of a switch. The 104 is only 4.5" × 2.5" × 1.25" and comes with all cables and connectors for your computer. You supply the serial cable for your modem or other serial device.

Model 103 Combo $68.95



With the turn of a knob the model 103 switches your computer's RS232C serial port to any one of 3 outputs — 2 serial and 1 parallel. The serial ports may be used for modems, serial printers or even another computer. The parallel port can be used with any Centronics compatible printer. The 103 has the best features from the 101 and 102: color coded position indicator lights, 6 switch selectable baud rates, heavy anodized aluminum cabinet, and many more.

Model 102 Switcher $35.95



The Model 102 has 3 switch positions that allow you to switch your computer's serial output between 3 different devices (modem, printers or another computer). The 102 has color coded lights that indicate the switch position. These lights also act as power indicators to let you know your computer is on. Supplied with the 102 are color coded labels that can be applied to your accessories. The 102 has a heavy guage anodized aluminum cabinet with non-slip rubber feet.

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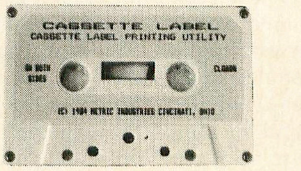

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More C Programs for Beginners

We often get more reaction after we publish a short program than we do when we publish a major application. This was the case with the C utilities submitted by Robert J. Apida in the September 1985 issue. In fact, those programs inspired Dennis J. Duke of Bessemer, Alabama, to try his hand at programming in C and he has shared his efforts, *O.Pak* and *Vi*.

O.Pak performs a task exactly the opposite of Apida's *Nores* program. It installs the *O.Pak* standard character set and runs *HiRes* to install the 51 character-wide screen. *Vi* uses *Nores* to kill the Hi-Res screen, calls *TSEDIT* with its file ID as an argument. Later after you finish using *TSEDIT* and exit with the ":q" command, *Vi* calls *O.Pak* to reinstall the Hi-Res screen. Duke finds *Vi* useful because *TSEDIT* works much better when it is run from the standard Tandy OS-9 screen because it has 6K more memory at its disposal. The *O.Pak* Hi-Res screen alone uses 6K of memory.

O.Pak

This utility loads the *O.Pak* standard character set from the normal Tandy OS-9 screen.

```
#include <stdio.h>
#define  CMD  "HiRes"
#define  C1   15
#define  C2    0
#define  C3    1
#define  C4   27
#define  C5   87
#define  C6   42

main()
{
    char *CMD_line[80];

    strcpy(Cmd_line,CMD);
    system(Cmd_line);
    Putchar(C1);
    Putchar(C2);
    Putchar(C3);
    Putchar(C4);
    Putchar(C5);
    Putchar(C6);
}
```

This program is very simple and takes the straightforward approach. That's a good way to start with any language. Just for the fun of it, when you get *O.Pak.c* running, try defining the characters needed to print as an array of integers. Then, send them out to the standard output path with Putchar one by one. If that works, try another approach of your own.

Vi

This utility removes the *O.Pak* Hi-Res screen utility, returns to the standard OS-9 screen and executes *TSEDIT* with its file ID. After you are finished editing, it returns to *O.Pak*'s Hi-Res screen. It uses the C "system()" function to do this. *O.Pak*, *Nores* and *TSEDIT* must be stored in your current execution directory before you run *Vi*.

```
#include <stdio.h>
#define CMD1 "NoRes"
#define CMD2 "TSEDIT"
#define CMD3 "o.pak"

main(argc,argv)

int argc;
char *argv[];
{
   char *Cmd_line,CMD1);
   system(Cmd_line);
   strcpy(cmd_line),CMD2);
   strcat(Cmd_line,argv[1];
   System(Cmd_line);
   strcpy(Cmd_line,CMD3);
   System(Cmd_line);
}
```

Joysticks in C

Another person experimenting with new frontiers is Eric Richards of Auburn, Alabama. He was so impressed with the new mouse-driven packages at Radio Shack stores nationwide that he wanted to try his hand at programming the joystick ports (Listing A). The value of the 'Y' coordinate returned by Eric's program is the opposite of that returned by the corresponding routine in Radio Shack Color BASIC. The 'X' value returns the same value as the equivalent BASIC routine.

Listing A:

```
#include <stdio.h>
#include <os9.h>
#define void int
#define clear 12 /* clear screen character */
#define home 1   /* home cursor character */

main()
{

/* Routine checks both joysticks.   Press fire button                    test
*/
/* Test uses OS-9 I$GETSTT system call */

int x,y,fire,choice;

putchar(clear);

for (choice = 0; choice< 2; choice++)
       do
        {
         putchar (home);
         joystck(choice, &x, &Y, &fire);
         printf( "%2d : x=%3d y=3d/n", choice, x, y);
        }
      while (fire==0);
}
void joystck(num,xval,yval,button)
int  num,*xval,*yval,*button;
{
   struct registers reg;

   reg.rg_x=num;       /* x= joystick # (0 or 1) */
   reg.rg_a=1;           /* a = path #1 or standard output */
   reg.rg_b=SS_JOY;  /* b= function code $13 */

if (_os9(I_GETSTT, &reg)) /* system call */

   {
      printf(" ** ERROR in joystick read/n");
      exit(1);
   }

   *xval=reg.rg_x; /* x= horizontal value */
   *yval=reg.rg_y; /* vertical value */
   *button=reg.rg_a; /* a = fire button ($FF= on)($00= off)  */
}
```

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ASIC

-9 Users Group treas-
of *Kansas City BASIC*, has
wo fixes to that program. You
EDIT to change the source code file
plied with the program and reassemble
it. Or, you can send your original *Kansas City BASIC* disk with $5 for postage and handling to Steve at 8609 East 73 Terrace, Kansas City, MO 64133 and he will do it for you.

Before you change the actual code, edit the line at the label REVS. This sets the revision level of the program module. At the label XP290, delete the following three lines:

```
XP290 CMPA #'-
      BNE XP291
      LEAY 1,Y
```

Replace them with:

```
XP290 CMPA #$FF Sub_function ?
      BNE XP291 ..No
      LDA 1,Y   Get Sub-Function Code
      CMPA #$92 Minus Function?
      BNE XP291 ..No
      LEAY 2,Y  Skip Codes
```

This change fixes a subtraction problem. Now, following the label TSTVE04, find this line:

```
CMPA #'@  Range Check
```

Replace it with:

```
CMPA #$2F Range Check
```

Two instructions later, just before the statement:

```
TST HCLDA+1,U
```

Insert:

```
 TFR A,B
 SUBB #'0 Subtract a zero
 CMPB #9  Is is a number?
 BLS TSTVE06 .. Yes
 CMPB #16  Is is Alpha?
 BLS TSTV15 ..No
TSTVE06 EQU *
```

The last set of changes allows variable names with numerics to be used following the initial required alphabetic character.

Odneal reports that he is getting excellent response to *Kansas City BASIC* and noted that several users have asked for string and numeric arrays and graphics ability. He notes that graphics would be the easiest and asks that you let him know if you have strong interest in having graphics support in *Kansas City BASIC*.

A lot of people stop after one major project like *Kansas City BASIC*. Not Steve! He is working on a *Kansas City COBOL* compiler for OS-9 and researching a FORTH and C. All will be packaged with the source code provided.

"So much software today is overpriced, unchangeable and poorly documented," Odneal said. "I feel that if users have good BASIC software with proper documentation, most of them can modify it to meet their own needs. The entire OS-9 community will benefit. If you would like to join this effort, let me know."

Microware Shipping OS-9 FORTRAN

Phyllis Casel, the communications coordinator at Microware, reports shipping the 6809 FORTRAN Compiler in February. The new compiler is a subset of the FORTRAN 77 ANSI standard with a number of powerful extensions. Highlights include the ability to generate code for two- or four-byte integers, single and double precision floating point support, a full math library and an updated C compatible linker and assembler.

If you are looking forward to moving up to an OS-9 68K system, take note. The OS-9 Network file system, which features a user interface similar to the normal OS-9 file system, is also shipping as is a brand new version, 2.00, of the 68K C compiler.

The popularity of OS-9 is growing so fast that Microware is expanding to meet demands.

More Tricks

The new Iniz command in the 2.00.00 version of OS-9 is excellent. It lets you eliminate the memory fragmentation caused by opening a path to a printer or other device during operation. You simply put the command "Iniz P" in your *startup* file and go.

When I first tried to run Iniz, without reading the directions of course, I typed "Iniz /p" on the command line and wound up with a nasty error message on my Color Computer screen. I scratched my head and looked at the book only to learn that the programmer who wrote Iniz had dropped the slash, '/' — the same slash that always tells OS-9 to look for a device rather than a file — from the command line syntax. I wonder why? I thought the idea behind OS-9's unified I/O was to make everything consistent.

Now, the good news. If you don't have Version 2.00 and don't plan on getting it for a while, you can emulate the Iniz feature with a short program (Listing B) from Steve Goldberg in Bethpage, New York. When you run the program — usually from your *startup* file — it merely opens up a path to your printer and then closes it before you have had an opportunity to load any other programs in memory. This means the printer buffer is set up at the very top of RAM, leaving you with a continuous block of free memory.

Listing B:

```
* PBUF -- copyright (c) S. B. GOLDBERG
*
* Initializes printer buffer to prevent memory
* fragmentation.
*
  ifpl
  use /d0/defs/os9defs
  endc
*
  mod len,name,prgrm+objct,reent+1,entry,dsiz
*
  rmb 200 for stack
dsiz  equ .
*
name  fcs /pbuf/
      fcc /(c) 1985 S. B. Goldberg/
*
entry leax pntr,pcr name of printer
      lda #write.   write mode
      os9 I$open    open path
      bcs out       exit with error
      os9 I$Close   close printer path
      bcs out       exit with error
      clrb          clear error flag
out   os9 f$exit    quit
pntr  fcc "/p"      name
      emod
len   equ *
      end
```

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3. What will DYNACALC do for ME?
That's a good question. Basically the answer is that DYNACALC will let your computer do just about anything you can imagine. Ask your friends who have Lotus 1-2-3, VisiCalc, or similar programs, just how useful an electronic spread-sheet program can be for all types of household, business, engineering, and scientific applications.

4. Do I have to learn computer programming?
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8. Is there a version of DYNACALC for MY system?
There's a version of DYNACALC for EVERY OS-9 system. Unless you have a CoCo, you need a CRT terminal with at least 80 characters per line, and direct cursor addressing. You can mix different brands of terminal on the the same system. The CoCo OS-9 version is compatible with 80-column hardware cards, or will work with the standard 32x16 screen.

9. How much does DYNACALC cost?
Radio Shack sells the CoCo OS-9 version for $99.95. The general 6809 OS-9 version is priced at $250; $595 for the OS-9/68k version. Foreign orders add $10 per copy for postage. We encourage dealers to handle DYNACALC since it's a product that sells instantly upon demonstration. Call or write on your company letterhead for more information.

10. Where do I order DYNACALC?
If you have a CoCo, order # 26-3275 at your local Radio Shack store. Otherwise, see your local DYNACALC dealer, or order directly from CSC at the address below. We accept telephone orders from 10 am to 6 pm, Monday through Friday. Call us at 314-576-5020. Your VISA or MasterCard is welcome. All orders are shipped on 5" diskette unless you specify otherwise. Please tell us if you need Microware (standard) or Mizar format.

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DYNACALC ♥ OS-9

Eliminating Hard Coding

It bugs me to see a programmer ruin an otherwise excellent piece of software by hard coding system device information into the program itself. Let's study an example.

The new 256K RamDisks available now for the Color Computer make OS-9 operation a dream — if the programmer hasn't hard-coded his program. When I first boot OS-9, I *format* the RamDisk and *backup* the disk that contains my current execution directory. Then, I change both the execution and data directories to the RamDisk.

But, what do you think happens when you hit the wrong key while typing a command line? You guessed it, OS-9 reports an error and if you have installed *PrintErr*, you hear drive /d0 start up while OS-9 looks for the proper message to print. I saw this happen a couple of times with dismay.

Here's the fix. At an offset of 0016 — in the 2.00 version of *PrintErr* — you will find the string /D0/SYS/ERRMSG. Use *Debug* to change the /D0 to "...". This tells OS-9 to look in the SYS directory on the parent of the parent of the current data directory. If your current data directory is /R0, the "..." will cause *PrintErr* to look on /R0. If it is /H0, it will cause it to look on /H0. After you have made the change and exited *Debug*, save the module to a disk file, *newPrintErr* perhaps. Rename the original to *PrintErr.Original* and then type:

```
OS9: verify </d0/cmds/newPrintE
rr >/d0/cmds/PrintErr U
```

DeskMate, the mouse-driven masterpiece from Tandy, has the same problem — it hard codes four separate device names. Fortunately, the four pathlists are coded in only one file, *desk*. Here is a table with the old values and the new values.

Table 1: Offset Values

```
00E72F 44 30 (/D0) (old)
2F 52 30  (/R0) (new)
or 2E 2E 2E (...)

01102F 44 31 (/D1) (old)
2F 52 30 (/R0) (new)
or 2E 2E 2E (...)

01392F 44 30 2F 43 4D 44 53  (/D0/CMDS) (old)
2F 52 30 2F 43 4D 44  53 (/R0/CMDS) (new)
or 2E 2E 2E 2F 43 4D 44 53 (.../CMDS) (new)

01622F 44 31 2F 43 4D 44 53 (/D1/CMDS) (old)

2F 52 30 2F 43 4D 44 53 (/R0/CMDS) (new)
or2E 2E 2E 2F 43 4D 44 53 (.../CMDS) (new)
```

After you make the changes above, update the *desk* module's CRC using *verify*'s u parameter. Then, run *DeskMate* from your RamDisk and stare back in amazement. Click the button on the mouse a couple of times and *DeskMate* will snap to your next application almost instantaneously. It's a lot like running similar software on a Macintosh with a hard disk but a whole lot cheaper. Despite the fact that applications are all relatively simple, *DeskMate* has to be the best thing to hit the Color Computer, since OS-9. In fact, I have a friend here in Washington who uses *DeskMate*'s text editor to enter almost everything he writes because of the large, easy-to-read characters it displays. If he has a complicated formatting job and needs a more powerful text processor, he simply runs the output file generated by *DeskMate*'s text editor through a more comprehensive text processor such as *DynaStar.*

Yet Another Tip

How do you prompt yourself to change disks from a procedure file while doing a single disk copy? One quick way suggested by Brian Lantz, president of the OS-9 Users Group, is to use the OS-9 SLEEP utility command. You always knew there was a use for that command, didn't you? Try this in your procedure file:

```
-X
Echo
T
* Change Disk then
* Type 'Break' key to continue
-T
Sleep 0
X
(* Rest of procedure file follo
ws the "x" *)
```

Notice how we used the four built-in Shell commands x, -x, t and -t. The -x command in the first line of the procedure above tells OS-9 to ignore any errors on the command line and go ahead with the rest of the procedure file. Without that command, OS-9 would abort the procedure file if it hit an error.

The t command tells the Shell to pass anything on the standard input path through to the standard output path. The -t tells it not to pass this information. Notice how we used the t command in conjunction with the echo command to send more than one line of text in our prompt. Do not forget the asterisk, '*'. It tells the OS-9 Shell that everything else on the line that follows is a comment and should be ignored.

Auto RamDisk

We recently experimented for a long time trying to come up with a way to switch our current execution directory to /R0/CMDS and our current data directory to /R0 automatically from the *startup* file. Our first attempt looked something like this:

```
PRINTERR
XMODE /P1 LF
TMODE .1 -UPC -PAUSE
SETIME </TERM
INIZ P1 T2
FORMAT /R0
YDALE'S RAMDISK
BACKUP #100 /D0 /R0
YY
TMODE .1 PAUSE
CHX /R0/CMDS
CHD /R0
```

Unfortunately, it didn't work. As soon as this startup procedure file was executed, it sent an End of File signal to OS-9. This killed the Shell running it, and all the changes we made died with the Shell.

Next, we replaced the CHX and CHD command lines with:

```
EX LOGIN </TERM
```

We also edited the first line of the file, SYS/PASSWORD. When we were finished it read:

```
,,0,128,/r0/cmds,/r0,shell
```

This worked and we wound up in the proper execution and data directories. But when we did a procs command, we found that we had an extra Shell alive. It was the Shell that executed the startup procedure file and it was wasting 6K of memory. As an experiment, I tried to kill the extra Shell by typing:

```
OS9: kill 4
```

That didn't work because OS-9 will not let you kill the parent of a child process that is running. Finally, I left the login command line out of the *startup* file and typed it myself — interactively after the startup command was finished and OS-9 prompted me. This worked and I was left with only one Shell! Unfortunately the switch was still only semi-automatic.

Incidentally, we used the tmode -pause command in our procedure file so the backup command wouldn't stop and wait for us to press a key after it filled the screen with reports. Another alternative, if you have installed the new nil device that comes with Version 2.00, is to redirect the output of the backup command to that device. The following command line will do the job for you.

```
BACKUP #100 /D0 /R0 >/NIL.
```

SysGo: The Real Answer

Robert Larson at the University of Southern California at Los Angeles dropped us a note several months ago to promote the virtues of *Kermit* over *Xmodem*. We quote:

"*Kermit* has several advantages over *Xmodem*. It makes fewer assumptions about the system it is running on and the communications path it can use, so it will work on a wider variety of systems," Larson said. "*Xmodem* is probably still better for what it was designed for — CP/M to CP/M file transfer over eight-bit data links that can handle bursts of 132 characters. There are hundreds of *Kermit* implementations and dozens of *Xmodem* implementations. The central *Kermit* authority of Columbia University also helps make sure that all versions of *Kermit* work with each other and that improvements in the protocol are made in a compatible way."

Larson reported that there are at least three separate conversions of the "old" UNIX *Kermit* to OS-9. He said the latest version he has worked on is based on the

Glen Seaton version with connect code from Bradley Bosch and some fixes by James Jones. It is available via the normal *Kermit* distribution channels at Columbia University. He reported that he has also posted 35 copies, including four to Europe and one to Australia, via UUCP USENET mail. The Glen Seaton version is available in the OS-9 Users Group Library and on CompuServe.

We feature here a replacement *SysGo* module Larson contributed. It is smaller and faster than the original, but more importantly, it holds the clues to making the automatic change to alternate execution and data directories.

Alternate *SysGo* Listing

```
ifpl
use /d0/defs/os9defs
endc

c.cr equ $d
mod eom,name,$C1,$81,start,$00C8
namefcs /SysGo/
fcb 6
Cmds Fcc /Cmds/
Fcb c.cr

Shell Fcc /Shell/
Fcb c.cr

Startup Fcc /Startup -p/
fcb c.cr

Initdat Fcb $55,$00,$74,$12,$7F,$FF,$03,$B7
Fcb $FF,$DF,$7E,$F0,$0C
idatlen equ *-initdat

startleax <rti,PCR
OS9 f$icpt
leax <initdat,PCR
ldu #$0071
ldb #idatlen
movidat lda, X+
sta,U+
decb
bne movidat
leax <Cmds,PCR
lda #4 execution directory
os9 i$chgdir
leax <Shell,PCR
leau <startup,PCR
ldd #$0100
ldy #21
os9 f$fork
bcs infloop
os9 f$wait
restart leax <Shell, PCR
ldd #$0100
ldy #$0000
os9 f$fork
bcs infloop
os9 f$wait
bcc restart
infloop bra infloop

rtirti

emod
eom equ *
```

SysGo is an OS-9 program that just happens to be the first process to run when booting the system. Essentially, it does three things: executes the procedure file, *startup*; starts your first process — read program and usually a Shell; then, it simply waits for all other processes to die.

If you look at the previous code, you will notice that Larson's version of *SysGo* goes into a wait state just before the label, "restart." If for some reason the original Shell that it has just started were to die, *SysGo* will automatically restart another

Listing 1: ***pf.c***

```
#include "header.c"
#include "main.fast.c"
#include "linefeed.c"
#include "c_return.c"
#include "print.c"
#include "space.c"
#include "putcont.c"
#include "left_m.c"
#include "contr.c"
#include "pr.header.c"
#include "end_page.c"
#include "sing_line.c"
#include "dot.c"
#include "cont_proc.c"
#include "useage.c"
#include "cput.c"
```

Listing 2: ***header.c***

```
/* This is the header file file which contains all of the  */
/* define's and global variables for a new text processing */
/* and formatting program that will do the most common     */
/* functions of "dynaform".                                */

#include <stdio.h>
#include <ctype.h>
#define  FALSE 0
#define  TRUE 1

int spacing = 1; /* set by .SS or .MS */
int offset = 8;  /* set by .PO */
int pg_no = 1;   /* set by .BP or .PN */
int pg_len = 66; /* set by .PL */
int bot_mar = 8; /* set by .MB */
int foot_mar = 2; /* set by .FM */
int top_mar = 3; /* set by .MT */
int header_mar = 2; /* set by .HM */
int linefeed = FALSE;
int code[27][8];
int line_no = 1;
int first_char = TRUE; /* denotes first charactor on a line */
int underline = FALSE; /* controls "controlled underlining */
int q_flag = FALSE; /* true after control Q */
int s_flag = FALSE; /* true after control S */
int w_flag = FALSE; /* true after control W */
int y_flag = FALSE; /* true after control Y */
int sheet_flag = FALSE; /* if false  tractor  paper,  if  true  single
sheet */
int pr_flag = TRUE; /* flag for printing characters */

int spage =0; /* number of page to start printing */
int epage = 30000; /* page number to stop printing */

char head[133];
char foot[133];
char temp[133];

int contrl;

FILE *path, *fopen();

                                                                        /*
 =========================================================================
*/
```

Listing 3: ***main.fast.c***

```
main(argc, argv)
int argc;
char *argv[];

{
FILE *input_file;
int i, j, cnt, temp,count =1,out_flag = FALSE;
char option;

static char hd[]= " ";
static char ft[]=  "                                        #";
```

```
     if((input_file = fopen("prtr.contrl","rx"))== NULL)
     {
          printf("I couldn't open printer configuation file");
          exit(1);
     }

     fread(&code[0][0],sizeof(int),216,input_file);

     fclose(input_file);

     if(code[0][0] == 1)  /* check if linefeed needed */
          linefeed = TRUE;
     contrl = code[0][1];  /* load charactor used as control flag */

/* Open a path for output and get number of copies         */
     if(argc > 2)
     {
          for(i=2; i < argc; ++i)
          {
               if((argv[i])[0] == '-')
               {
                    j = 1;
                    while((option =argv[i][j]) != NULL)
                    {
                         if(isalpha(option) == FALSE)
                         {
                              printf("Error in options\n");
                              useage();
                              exit(6);
                         }
                         cnt = 0;
                         ++j;
                         while(isdigit(argv[i][j]) != FALSE)
                         {
                              cnt = cnt * 10 + (argv[i][j] - 48);
                              ++j;
                         }
                         option = toupper(option);
                         switch (option)
                         {
                              case 'C':
                                   count =cnt;

                                   if(count < 1)
                                   {
                                      printf("Number of copies set  to
zero\n");

                                      exit(1);
                                   }
                                   break;
                              case 'S':
                                   spage = cnt;
                                   if(spage > 1)
                                        pr_flag = FALSE;
                                   break;
                              case 'E':
                                   epage = cnt + 1;
                                   break;
                              default :
                                   printf("Unknown option\n");
                                   useage();
                                   exit(7);
                                   break;
                         }
                    }
               }
               else
               {
                    if((path = fopen(argv[i],"w")) == NULL)
                    {
                         printf("I    can't    open    a    path    for
%s\n",argv[i]);
                         useage();
                         exit(2);
                    }
                    out_flag = TRUE;
               }
          }
     }
     if(out_flag == FALSE)
     {
          if((path = fopen("/p","w")) == NULL)
          {
                printf("I can't open a path to the printer\n");
                exit(3);
          }
     }
 /* Open the path for the input file          */
     for(i=0; i < count; ++i)
     {

 strcpy(head,hd);
 strcpy(foot,ft);

      if(argc >= 2)  /* check for path name */
      {
           if((input_file = fopen(argv[1],"r")) == NULL)
```

Shell. This keeps you from crashing the system if you accidentally kill all the processes running.

When OS-9 runs the *SysGo* program it automatically sets the execution directory to /D0/CMDS. It knows that /D0 is the startup device because it looked in the Init module, which is simply a look-up table that holds the initial information needed to start the system. Information stored in Init includes the upper limit of RAM memory, the number of entries in the IRQ polling table, the number of entries allowed in the system device table, the name of the first program to run (most often *SysGo*, the name of the device that holds the default directory — usually, /D0, the device that becomes the standard input and output paths) and, finally, the name of the bootstrap file, *os9boot*, in the case of Color Computer OS-9.

The secret to changing data and execution directories to /R0, or even /H0, is to add some code to change those directories. However, since a RamDisk doesn't exist until the start-up procedure file runs format and backup to create it, you cannot add this code until after *SysGo* runs the start-up procedure. You will need to add two new labels just in front of the CMDS label in the *SysGo* listing. Something like this:

```
newdir fcc "/R0"
  fcb c.cr
newexe fcc "/R0"
Cmds   fcc /Cmds/  resume old code here
```

Then, after the OS-9 f$wait call, just in front of the existing "restart" label, add the following code:

```
leax <newdir,PCR point to new data directory
lda #3    files may be updated
os9 I$chgdir
leax <newexe,PCR point to new execution directory
lda #4    files may be executed
os9 i$chgdir          do it
Restart leax <Shell, PCR    and resume old code
```

The code creates a Shell and runs the programs that have been placed in the start-up procedure file. When the *startup* file ends, OS-9 receives an EOF signal and the Shell that ran the procedures dies. When this happens, execution continues with the new code that changes the current data directory to /R0 instead of /D0 and the current execution directory to /R0/CMDS instead of /D0/CMDS. After *SysGo* runs your code, it falls into the code at the label restart where it starts another Shell.

This *SysGo* module was written for Version 1.00 and 1.01. It should also work with Version 2.00. However, it does not start the clock module like the *SysGo* that comes with Version 2.00. If you use this version, you need to start the clock with the setime command in the *startup* file.

To install this *SysGo* module you go through several steps. First, assemble the code using the asm command that comes with OS-9. Then, replace the original *SysGo* with your version in a new OS9Boot file using *OS9Gen*. Hopefully, Larson's code and our short notes have removed some of the mystery surrounding *SysGo* and you feel free to experiment and customize your system to your heart's content. Let me know how it works out and if you really come up with a unique version be sure to share it with us.

Users Group Sports First Online Recruit

Congratulations to John M. Graf of Riverside, California. John was the first person to join the group online using the new services available on THE RAINBOW's Delphi Color Computer SIG. His Username is JMFG if you want to say hello.

RAINBOWfest-Palo Alto was a big one for the OS-9 community. Paul Searby gave an inspiring keynote speech at the first OS-9 buffet breakfast attended by more than 60 people. Brian Lantz presented an excellent seminar for OS-9 users and was kind enough to fill in during the first half of my seminar when snow in Washington and rain in California delayed my arrival Saturday.

We saw an interesting approach to OS-9 in a new Winchester BASIC product from Owl Ware in Palo Alto. Interesting idea and we'll be telling you a lot about it with information direct from its author, Alan Reinhart, next month.

The OS-9 community certainly has its heroes and they strive to make your entry into the world of OS-9 Version 2.00 easier. Included in our list of good guys are Ed Bender at PBJ, Dan Johnson at D.P. Johnson and Paul Searby at Computerware. All had to dive for the disassemblers as they hustled to rewrite new drivers that would run on Version 2.00 of OS-9. Next month, we'll take an in-depth look at this new version of OS-9 and try to let you know what you can do with it.

During the evolution, our aforementioned heroes entered several new packages into the utility arena. We'll feature some of the more advanced products, especially Brian Lantz's *kShell*, here next month. Once you use the *kShell*, which is modeled after the Shell in OS-9 68K, you'll never go back. Until then, keep on hacking. ☐

```
               {
                    printf("I can't open %s for reading\n",argv[1]);
                    useage();
                    exit(4);
               }
          }
          else
          {
               printf("You   must   put   a   filename   in   the   command
line\n");
               useage();
               exit(5);
          }

/* We are now ready to begin the actual printing of the document */

          print(input_file);
          fclose(input_file);

/* When we return to this point we must now finish the last page */

          end_page();
/* Reset all variables for next pass if required                 */

          if(spage > 1)
               pr_flag = FALSE;
          else
               pr_flag = TRUE;
          spacing = 1;
          offset = 8;
          pg_no = 1;
          pg_len = 66;
          bot_mar = 8;
          foot_mar = 2;
          top_mar = 3;
          header_mar = 2;
     }
     fclose(path); /* close our output path (to printer ?) */
}
                                                                   /*
======================================================================
*/
```

Listing 4: *linefeed.c*

```
/* this function puts out either a cr-lf or a blank-cr pair  depending
of the */
/* state of the linefeed flag.  The blank is required by some printers
as they*/
/*     will      not       responed       to       only       a       cr.
*/

int Linefeed()
{
char lf ='\012'; /* linefeed code  */
char cr ='\015'; /* carridge return code */

     if(linefeed == TRUE)
     {
          cput(cr,path);
          cput(lf,path);
     }
     else
     {
          space();
          cput(cr,path);
     }
     ++line_no;
}
                                                                      /*
===================================================================*/
```

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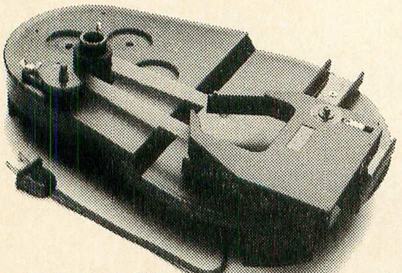

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Listing 5: ***c_return.c***

```
/* this function processes each linefeed fould in the text and
determines */
/*   how   many   line   spaces   between   lines   are   required
*/

int c_return()
{
int i;
     for(i=1; i<= spacing; ++i)
          Linefeed();
     first_char = TRUE;
}
                                                                    /*
=====================================================================*
/
```

Listing 6: ***print.c***

```
int print(fi)
FILE *fi;   /* we passed a file pointer */
{
int c,test;

    while((c=getc(fi)) != EOF)
     {
       test= TRUE;
          if(c=='.' && first_char == TRUE)
               {
               dot(fi); /* process dot commands */
               test = FALSE;
               }
          else if(c == contrl)
               {
               contr(fi); /* process control charactors */
               test = FALSE;
               }
          if(test == TRUE)
          {
               if(line_no ==1 && first_char == TRUE)
               {
                    header(fi); /* printer header */
               }
               if(first_char == TRUE)
               {
                    left_m();  /* print left margin */
                    first_char = FALSE;
               }
               if(c != ' ' && c != '\015') /* test for blank and cr */
               {
                    cput(c,path);
               }
               else
               {
                    if(c == ' ')
                         space();
                    if(c == '\015')
                    {
                         c_return();
                         if((line_no +spacing)>(pg_len-bot_mar))
                              end_page();
                    }
               }
          }
     }  /* closes while */
}  /* close print() */
                                                                    /*
=====================================================================*
/
```

Listing 7: ***space.c***

```
/* space() will toggle underline off if it is on and print */
/* a space and then toggle the underline back on if the    */
/* underline flag is TRUE                                  */

int space()
{
int off=22; /* code to turn underline off */
int on = 21; /* code to turn underline on */
char c = ' ';

     if(underline == TRUE)
     {
          putcont(off);
          cput(c,path);
          putcont(on);
     }
     else
          cput(c,path);
}
/* ====================================================================
*/
```

Listing 8: ***putcont.c***

```
/* putcont() is passed as int and will use that int to point to a */
/* row in code[row][col] matrix. It will put the int's in the row */
/* to the output until the element is >127.                       */

int putcont(row)
int row;
{

int col, pcode;

     for(col=0 ; code[row][col] <= 127; ++col)
     {
          putc(code[row][col],path);
     }
}
/* ================================================================*/
```

Listing 9: ***left_m.c***

```
/* left_m() will provide for indentation from the  left  side  of  the
page */
/*  before any line is printed.  It will also toggle the underline off
and */
/* on if the underline flag is TRUE. The column that the text is to be
*/
/*    printed    in    is    changed    with    the    .PO    command.
*/

int left_m()
{

int off=22; /* code to turn underline off */
int on = 21; /* code to turn underline on */
int col;
char c = ' ';

     if(underline == TRUE)
          putcont(off); /* turn off underline if flag is TRUE */

     for(col = 1; col < offset; ++col)
          cput(c,path);

     if(underline == TRUE)
          putcont(on); /* turn underline if flag is TRUE */
}
                                                                     /*
=====================================================================*
/
```

Listing 10: ***contr.c***

```
/* contr(fi) has the file pointer passed to it.  it will get  the next
*/
/*  charactor,  and  pass it to cont_proc() for the actual processing.
*/
/* it checks to see if the next charactor is also a control  char.  If
*/
/*  it  is, it will call itself.  if not, it will return the charactor
*/
/*                   to                     the                  file.
*/

contr(fi)
FILE *fi;
{

int col,c,i;

     c = getc(fi);

     if(c == 'P' || c == 'p')
     {
          i=0;
          while((c=getc(fi)) != contrl)
          {
               temp[i]=c;
               ++i;
          }
          temp[i] = NULL;
          printf("%s\n",temp);
          c = readln(0,temp,132);
          temp[c-1] = NULL;
          for(i=0; temp[i] != NULL; ++i)
               cput(temp[i],path);
          printf("\n");
          c  =  getc(fi);  /* throw away letter following control char
*/
     }
     else
```

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```
          cont_proc(c);

     if((c = getc(fi)) == contrl)
          contr(fi);          /* call again  */
     else
          ungetc(c,fi);     /* return charactor to file */
}
                                                                   /*
=================================================================*/
```

Listing 11: *pr.header.c*

```
/* This function controls the spacing at the top of the  document  and
*/
/*        the          printing          of          the          header.
*/

int header()
{

int hd_line;

     hd_line = top_mar - header_mar;

     while(line_no < top_mar)
     {
          if(line_no == hd_line)
               sing_line(head);
          Linefeed();
     }
}
/*   ======================================================================
*/
```

Listing 12: *end_page.c*

```
/* This function will print blank lines at the bottom to the footer
line  */
/* It will call for the footer line to be printed and print enough
*/
/* additional blank lines to get to the top of the next page.
*/

int end_page()
{

int foot_line;
char temp;

foot_line = pg_len - bot_mar + foot_mar;
     while(line_no <= pg_len)
     {
          if(line_no == foot_line)
          {
               sing_line(foot);
          }
          Linefeed();
     }
     ++pg_no;
     line_no =1;

     if(spage == pg_no)
          pr_flag = TRUE;
     if(epage == pg_no)
          pr_flag = FALSE;

     if(sheet_flag == TRUE && pr_flag == TRUE) /* single sheet flag */
     {
          printf("Put in next sheet of paper.\nHit a key\n\n");
          temp = getchar();
     }
}
/*
===========================================================================
*/
```

Listing 13: *sing_line.c*

```
/* sing_line() prints oout both the header and the footer lines. It is
*/
/* passed a pointer to the proper line. It also contains procedures to
*/
/* print the page number and handle control charactors in these lines.
*/

int sing_line(buffer)
char buffer[];
{

int i;
int temp_flag = FALSE;
char spc = '\007';
```

```
    left_m();

    if(underline == TRUE)
    {
         temp_flag=TRUE;
         underline = FALSE; /* turn underline flag off */
         putcont(22); /* turn underlining off */
    }

    for(i = 0; buffer[i] != NULL; ++i)
    {
              if(buffer[i] == '#' && pr_flag == TRUE)
                   fprintf(path,"%d",pg_no);
              else if(buffer[i] == spc)
              {
                        ++i;
                        cont_proc(buffer[i]);
              }
              else if(buffer[i] == ' ')
                       space();
              else
                   cput(buffer[i],path);

    }

    if(temp_flag == TRUE)
    {
         underline = TRUE; /* turn underline flag back on */
         putcont(21);      /* turn underlining on         */
    }
}
/*
=======================================================================
=*/
```

Listing 14: ***dot.c***

```
/* dot() processes the dot commands
*/

int dot(fi)
FILE *fi;
{

int i, temp_len, num, flag = TRUE, dot_c, c;
char pause;
char spc = '\007';
FILE *new_file;

/* form a code number from a two character string              */
     c= getc(fi);  /* get first character  */
     dot_c = (toupper(c) - 64) * 30;
     c = getc(fi); /* get second character */
     dot_c = dot_c +(toupper(c) - 64);

     if((c = getc(fi)) == '\015')
     {
          temp[0] = NULL;
          num = 0;
          temp_len = 0;
          flag = FALSE;
     }
     else
     {
          i = 0;
          while((c = getc(fi)) != '\015')
          {
               if(c == contrl)
                    temp[i] = spc;
               else
                    temp[i] = c;
               ++i;
          }
          temp[i] = NULL;
          flag = TRUE;
     }
     if((num = strlen(temp)) > 0)
          num = atoi(temp);

/* The switch cases now begin                                        */

     switch(dot_c)
     {
          case 76: /* .BP page break  */
               end_page();
               if(num > 0)
               {
                    pg_no = num;
                    if(spage > pg_no || pg_no >= epage)
                         pr_flag = FALSE;
                    else
```

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```
            pr_flag = TRUE;
    }
    break;
case 106:  /* .CP  conditional page break  */
    if((line_no + spacing * num) > (pg_len -bot_mar))
        end_page();
    break;
case 409: /* .MS multiple line spacing  */
    if(num == 0)
        spacing = 2;
    else
        spacing = num;
    break;
case 589: /* .SS single line spacing */
    spacing = 1;
    break;
case 193: /* .FM set footer margin  */
    foot_mar = num;
    break;
case 253: /* .HM set header margin  */
    header_mar = num;
    break;
case 392: /* .MB  set bottom margin */
    bot_mar = num;
    break;
case 410: /* .MT  set top margin */
    top_mar = num;
    break;
case 492: /* .PL set page length  */
    pg_len = num;
    break;
case 494: /* .PN set page number */
    pg_no = num;
    if(spage > pg_no || pg_no >= epage)
        pr_flag = FALSE;
    else
        pr_flag = TRUE;
    break;
case 495: /* .PO set page offset */
    if(num == 0)
        offset =1;
    else
        offset = num;
    break;
case 586: /* .SP  space lines on page */
    if(line_no == 1)
        header(fi); /* print header before spacing */
    if(num == 0)
        Linefeed();
    else
    {
        for(i = 1; i <= num; ++i)
            Linefeed();
    }
        break;
    case 593: /* single sheet flag set */
        sheet_flag = TRUE;
        break;
```

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```
case 496: /* print text and wait for character */
     printf("%s\n",temp);
     printf("Push any key to continue\n\n");
     getchar(pause);
     break;
case 195: /* .FO text for footer line buffer */
     strcpy(foot,temp);
     break;
case 245: /* .HE text for header line buffer */
     strcpy(head,temp);
     break;
case 189: /* open and use text from a new file */
     if((new_file = fopen(temp,"r")) == NULL)
          printf("I can't open %s for reading\n\n",temp);
     else
     {
          print(new_file);
          fclose(new_file);
     }
     break;
case 500: /* .PT print text and wait for line from stdin
            and print that line                  */
     if(temp[0] == NULL)
          printf("Enter line of TEXT\n");
     else
          printf("%s\n",temp);
     c = readln(0,temp,132);
     temp[c-1] = NULL;
     sing_line(temp);
     Linefeed();
     printf("\n");
     break;
case 93: /* .CC  change control character        */
     contrl = num;
     break;
case 102:  /* .CL    comment line                */
     break;
default:

               printf("Unknown operator- code of %d\n\n",dot_c);
               break;
     }
}
/*
=================================================================*/
```

Listing 15: *cont_proc.c*

```
/* cont_proc(c) is passed a character which is to processed as a
control*/
/* charactor, check to see that it is an alpha, convert it to upper
*/
/* case and subtract 64 form it converting it to a control code. This
*/
/* number is the row in the code[row][col] matrix. It is passed to
*/
/* putcont() which will send the code to the output. after returning,
*/
/* it checks to see if the next charactor is also a control char. If
*/
/* it is, it will call itself. if not, it will return the charactor
*/
/* to the file.
*/
```

```
int cont_proc(c)
int c;

{
int col;

     if(isalpha(c))
     {
          col= toupper(c) - 64;

     switch(col)
     {
          case 17: /* toggle for control Q  */
               if(q_flag == FALSE)
               {
                    putcont(17);
                    q_flag=TRUE;
               }
               else
               {
                    putcont(18);
                    q_flag = FALSE;
               }
               break;
          case 19:  /* toggle for control S   */
               if(s_flag == FALSE)
               {
                    putcont(19);
                    s_flag = TRUE;
               }
               else
               {
                    putcont(20);
                    s_flag = FALSE;
               }
               break;
          case 21: /* toggle for controlled underlining */

               if(underline == FALSE)
               {
                    putcont(21);
                    underline = TRUE;
               }
               else
               {
                    putcont(22);
                    underline = FALSE;
               }
               break;
          case 23:  /* toggle for control W */
               if(w_flag == FALSE)
               {
                    putcont(23);
                    w_flag = TRUE;
               }
               else
               {
                    putcont(24);
                    w_flag = FALSE;
               }
               break;
          case 25: /* toggle for control Y  */
               if(y_flag == FALSE)
               {
                    putcont(25);
                    y_flag = TRUE;
               }
               else
               {
                    putcont(26);
                    y_flag = FALSE;
```

The Crossword Creator Contest

Can you create a totally symmetrical crossword puzzle with the *Word+* program and the specifications outlined in the accompanying article on Page 38 of this issue? If so, you may wish to enter The Crossword Creator Contest. And, if we choose to print your crossword puzzle, you will be awarded a special prize.

Send us a disk or cassette copy of the data file of your puzzle created by *Word+* along with a printed copy of the crossword puzzle — including the clues and answers. Be sure to put a title on the puzzle and if possible, follow a general interest theme.

Entries will be judged on the following criteria:

Puzzle symmetry
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Spelling
Creativity
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Enter as often as you like! Please note: We consider your act of entering the contest as consent to publish your creation.

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```
                }
                break;
            default:
                putcont(col);
                break;
            } /* close out switch */
        }
        else
            return;

    }
    /*
    ====================================================================*/
```

Listing 16: ***useage.c***

```
/* useage.c prints out the proper syntax and */
/* available options for printform           */
int useage()
{
     printf("\npf filename [-options] [output path]\n");
     printf("   filename is file to be printed and is required\n");
     printf("   options must be preceeded by '-'\n");
     printf("       c = number of copies\n");
     printf("       s = page to start printing\n");
     printf("       e = page to stop printing\n");
     printf("   follow option letter with desired number (no
spaces)\n");
     printf("Default output path is to the printer\n\n");
}
```

Listing 17: ***cput.c***

```
/* cput.c prints the character to the output path only if */
/* the printing flag is true.  This provides for partial  */
/* printing of documents                                  */

int cput(c)
int c;
{
     if(pr_flag == TRUE)
          putc(c,path);
}
```

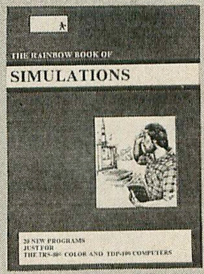
Listing 18: ***print.mod.c***

```
/*  This program accepts a file from standard input */
/*  and outputs a file called "prtr.contrl" for    */
/*  use by a printer formatting program             */

#include  <ctype.h>;
#include  <stdio.h>;

main()
{

int matrix [27][8];
int i, j, test, flag;
char input;
FILE *input_file, *fopen();

/* initialize all elements in matrix to 128 */
     for (i=0; i <= 26; ++i)
     {
          for (j=0; j <= 7; ++j)
          {
               matrix[i][j] = 128;
          }
     }

flag=0;    /* flag =0 until a "*" is found */

     while((input = getchar()) != EOF)
     {
          if(input == '*')
               flag=1;                  /*allows comment line */
          if( input == '+' && flag == 0) /*check for "+" sign */
          {
               flag =1;  /* an exception- stop search on this line */
               matrix[0][0] = 0;
          }
          if( input == '=' && flag == 0) /*check for "=" sign */
          {
               flag = 1;
               input = getchar();  /*move by fisrt blank */
               matrix[0][1] = return_int();
          }
          if( isalpha(input) && flag ==0) /* start processing of */
                                          /* of control letters  */
          {
               flag = 1;
               i = toupper(input) - 64;  /* convert letter to ascii */
                                         /* control code            */
               j=0;
               input = getchar(); /* skip first blank */

               while((input =getchar()) != '*')
               {
                    ungetc(input,stdin); /* if not "*", put char back
*/

                                        /* on file
*/
                    matrix[i][j] = return_int();
                    ++j;
               }
               ungetc(input,stdin); /* put "*" back on file*/
          }
          if( input == '\015')   /* test for cr */
               flag = 0;  /* flag is reset to process next line */
     }

     printf("\nThe printer module file has been read \n");

/* open and write the contents of matrix to the file */
/* note-- "wx" will write the file in execution dir  */
     if((input_file = fopen("prtr.contrl","wx")) == NULL)
     {
          printf("I can't open prtr.contrl\n");
          exit(1);
     }

     fwrite(&matrix[0][0],sizeof(int),216,input_file);

     fclose(input_file);




}

/* function to get a string and convert it to an integer */
int return_int()
{

char num_str[5],in;
int num, i;

i = 0;

     while(isdigit(in = getchar()))
     {
          num_str[i]=in;
          ++i;
     }
     num_str[i] = NULL;
     num = atoi(num_str);
     return(num);

}
```

Recommended Reading for Your CoCo from . . .

The Rainbow Bookshelf

THE COMPLETE RAINBOW GUIDE TO
OS-9
By Dale L. Puckett and Peter Dibble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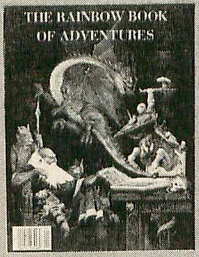

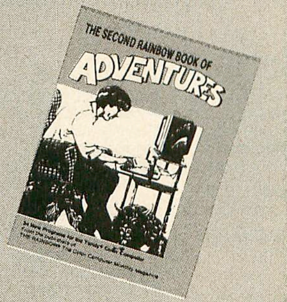

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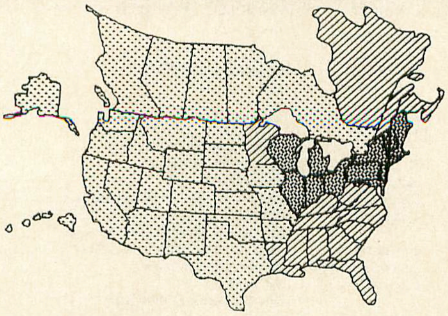

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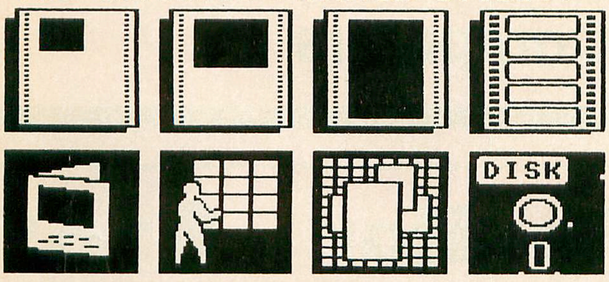

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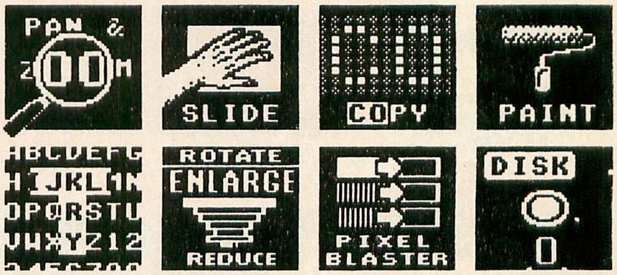

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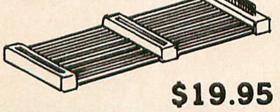

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COMPARE WITH OTHER INDIVIDUAL PROGRAMS COSTING IN EXCESS OF $100.00
DISK $49.95 . . . . Cat. No. 107CD

SPIT-N-IMAGE ©

M/L Disk Back-Up Utility

There is no need to suffer the heartbreak of crashed disks any longer. Spit-N-Image will create a mirror image of your valuable disk programs which do not respond to normal back-up functions. Will also initialize and back-up in one pass. Data processing experts always insist on having a back-up — it's good a practice.
REQUIRES 32K CC
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SPECIALS

Howard Medical Computers

Zenith 130 Color Monitor $159

Was $399
($14 shipping)

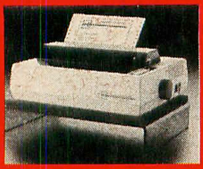
- Medium resolution 2.5 MHz 240 x 200 dots
- Same as 131 except No RGB
- With 90 day Zenith warranty
- **Monitors require video controller See page 34**

NEW
40 COLUMN

Epson RX-80FT $207

Was $318
($7 shipping)

REPACK



- Friction and tractor 80 column
- Bidirectional dot addressable 100 CPS
- Free Howard Printer tutorial included (a $29.95 value)
RX100 $362 each

Zenith Green Monitor $67.50

Reg. $149
($7 shipping)

- 12" Zenith 123A Green Screen is easy on the eyes
- High resolution: 640 dots x 200 dots,
15 MHz band width
- Composite video monochrome

REPACK
80 COLUMN

New! J&M Controller $128

JFD-CP
with JDOS

Reg. $149
($2 shipping)

- Eliminates software compatibility problems
- Single switch lets you switch from J DOS to RS DOS
- Gold contacts & data separator
- New serial port so you don't need a serial interface for a parallel printer

RS DOS ROM $20/ea.

Reg. $40
($2 shipping)

- ROM chip makes J&M compatible
- 24 pin fits both versions of J&M controller
- Release 1.1

Howard Medical Computers

Box 2, Chicago, IL 60690

Hours: 8-4 Mon.-Fri.
10-3 Sat.

(312) 278-1440

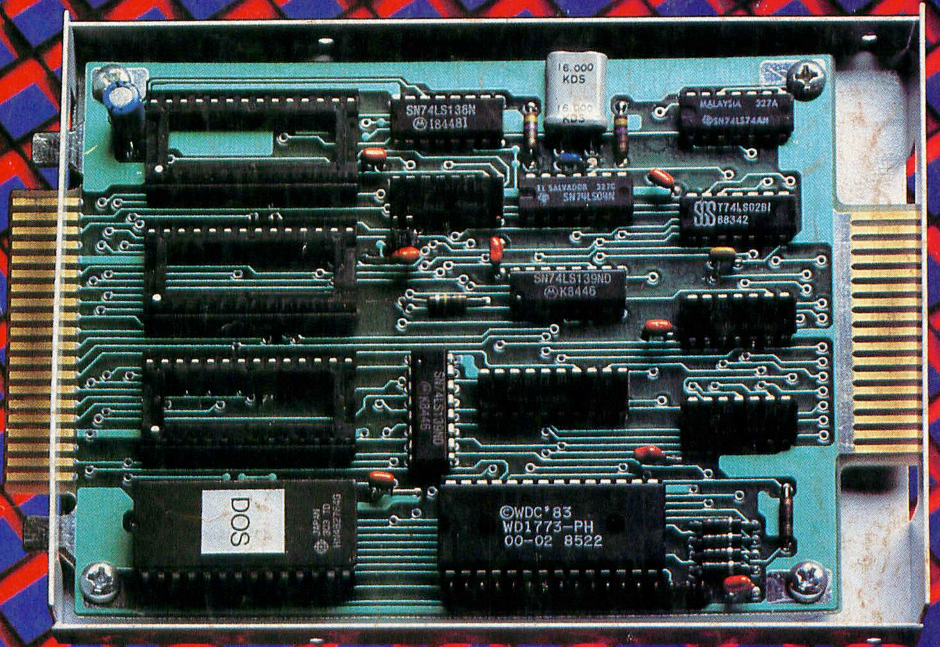
Howard Medical offers a 30-day return guarantee on all hardware we sell. Return equipment to us within 30 days for a refund if you are unsatisfied for any reason. Quantities limited and subject to availability.

DISTO

SUPER CONTROLLER

RAINBOW

ONLY $99.95 US.



FEATURES:

- Gold contacts on all connectors.
- Shielded metal box for low RF noise.
- 4 28-pin sockets for software expandability.
- Uses 2764 or 27128 EPROMS.
- EPROMS are software selectable.
- Internal Mini-Expansion Bus interface for;
  - 80 Columns
  - Real Time Clock and/or
  - Parallel Printer or
  - EPROM Programmer or
  - User Projects.
- Complete Radio Shack compatibility.
- New technology, no adjustments needed.
- Very Accurate 16mhz High Speed Master Clock.
- Needs +5 volts only, works on all COCOs or COCO IIs.

EXPANSION ADD-ONS:

There are currently four add-ons available from DISTO for this controller;

PPRINT
The first is a Centronics Compatible Parallel Printer adapter. This adapter will allow you to connect a Centronics compatible printer directly to your controller, leaving the serial port of your computer free for your modem. Printer driver software included.

RTIME
The second is a Real Time Clock. This is a clock chip that will keep the proper time, date and year. A small battery keeps the time when the Computer is off, retreive and set the time by using simple Basic POKES. Also available with the Real Time Clock is the optional Centronics Compatible Parallel Printer adapter. Software to set the clock and printer driver included.

MPROM
The third is a Mini EPROM Programmer. Yes, a low cost programmer that attaches to the disk controller. A must for the DISTO Super Controller. Program those often used utilities into EPROM and plug them directly into your controller. Will program 2764's or 27128's, a perfect mate for the DISTO Super Controller.

DISPLAY80
The fourth is a real knock-out. This is a three in one card. It's major function is to add an 80* 24 display to your computer. A feature packed package also includes RTIME and PPRINT. All in one neat package that fits inside the controller. OS9 software available. Call for more information.

CREDITS:

The DISTO Super Controller, add-ons and all its documentation are conceived and designed by Tony Distefano. The DISTO Super Controller and add-ons are manufactured and distributed by; C.R.C. COMPUTER INC.
10802 Lajeunesse, Montréal, Québec, Canada H3L 2E8 1-514-383-5293

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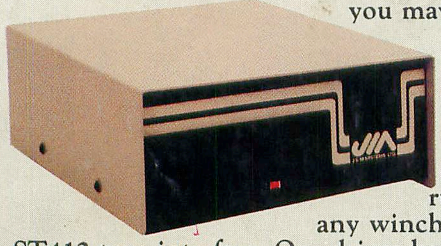
HEAT UP YOUR COCO!

New HARD DRIVES

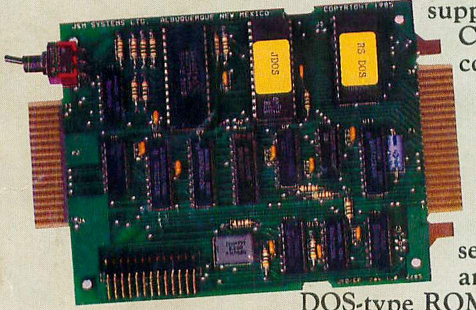
Besides the obvious advantage of increased disk access speeds and a vast amount of storage, our COCO hard drives boast many innovative features. For instance, you may boot OS/9 directly from JDOS - no intermediate boot floppy is required. Our software can run with virtually any winchester with a ST412 type interface. Our drives have capacities of 5, 10, or 20 MBytes (formatted), and may be either partitioned into up to 7 logical units or left as one large logical unit. Our COCO hard drive systems are complete with case, power supply, cables, OS/9 drivers, and instructions. Prerequisite: OS/9, JFD-CP controller.



5¼" 5 MByte full size	$495
5¼" 10 MByte ½ size	$650
3½" 20 MByte (shown above)	$795

JFD-CP DISK CONTROLLER

Our new JFD-CP, compatible with both the original COCO and the COCO 2, features a parallel port to support a Centronics compatible printer or our hard drive, and an external ROM switch, which allows you to select JDOS or an optional RS DOS-type ROM. It comes in a case and includes JDOS 1.2 and manual. JDOS implements all RS DOS commands, plus many more, including auto line numbering, error trapping, baud rate selection, OS/9* boot from floppy or hard drive, and Memory Minder**, our disk drive analysis program (Precision Alignment Disk not included).



JFD-CP Disk Controller with JDOS	$139

COCO-CLASSIC

Our old JFD-COCO controller remains a strong seller. Some people just like old "classics" best! So we have brought it back at the lowest price ever!

JFD-COCO Disk Controller with JDOS	$99

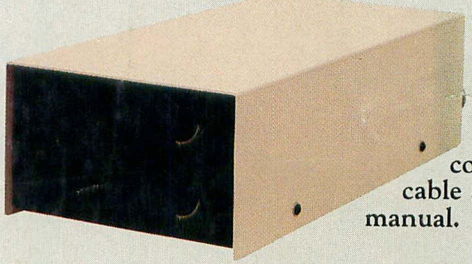
New TERMS

One-year warranty on parts & labor; 30-day money back guarantee (except shipping) if not totally satisfied. Items must be returned in like new condition.

Free shipping via UPS in continental United States for payment by VISA, MasterCard, or cashiers check. COD requires 10% prepayment by bank card plus 3% shipping. Blue Label and foreign shipping extra.

DRIVE SYSTEMS

Upgrade your Color Computer by adding our new JFD-CP disk controller, supercharged with JDOS 1.2 operating system, and a top quality drive with case and power supply. Comes complete with cable and JDOS manual.



Drive 0 System with one single side drive	$279
Drive 0 System with one double side drive	$349
Drive 0,1 System with two single side drives	$389
Drive 0,1 System with two double side drives	$489

MEMORY MINDER**

Memory Minder is a disk drive test program now included in JDOS. Used with a Precision Alignment Disk, Memory Minder allows you to check your drives for speed, alignment, sensitivity, hysteresis, and more! You can actually align or adjust the drives while viewing the graphics on the screen. No special equipment needed!

memory minder
A DISK DRIVE ANALYZER
Dysan
Memory Minder

PRECISION ALIGNMENT DISKS (From Dysan)

PAD-40X1: Tests single side disk drives	$26
PAD-40X2: Tests double/single disk drives	$33

Memory Minder is available on diskette for those who don't own a JFD-CP controller with JDOS. Includes Precision Alignment disk.

Memory Minder: single side package	$59
Memory Minder: single/double side package	$75

*OS/9 is a registered trademark of Microware, Inc.
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